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ABSTRACT

In response to issues surrounding the acquisition and planning of Pisgah State Park, New Hampshire, the Antioch/New England Graduate School has produced this set of activities related to land use decisions. Contained are learning experiences designed to help students appreciate New England's natural and cultural history in order to encourage a sense of responsibility and respect for the land. The six units deal with ecological succession, the hill farm community, New England's energy resources, using the winter landscape, the politics of wilderness development, and future land use decisions. Each unit begins with a major pacesetting activity, followed by a series of supplementary studies. Detailed background information regarding biological and social aspects of the Pisgah State Park area accompanies several lessons. While many activities presented are field experiences in Pisgah State Park, these lessons are also intended to serve as models for land use studies in other locations. (WB)

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# YANKEE LANDS:
## A Land Use Curriculum Project

Antioch/New England Graduate School
Keene, New Hampshire 03431

U.S. DEPARTMENT OF HEALTH,
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# Forward

This is an activities book. What we contribute here are things for students to do that we believe will help them to appreciate the social and biological history of the New England landscape so that the utilitarian and exploitive nature of land use decisions can be tempered with a sense of responsibility and an attitude of respect for the land.

Concern for land as a community and national resource is not easy to teach. Though we still live off the land, most of us are detached from it in a way farmers and lumbermen are not. We pay more attention to the condition of the weather than we do to the condition of the land. Yet standard courses in the social and natural sciences provide ample opportunity to match theories to land use practices. The activities included here will show you some ways in which to do just that. By weaving some of these land use activities into the fabric of your subject, we trust that some of your students will respond with increased concern not only for land use issues but for the land itself.

When 200,000 acres of forested land was acquired by the state of New Hampshire and designated as Pisgah State Park, questions arose within and without state government as to how the land would be put to use. Any ideas of transforming the wilderness of Pisgah into a recreational area have been shelved in the face of rising costs and changing attitudes about land use. At the moment there are no plans to develop Pisgah beyond the stage of trail building to accommodate day trips by snowmobilers, cross-country skiers, and hikers. But is that the only way undeveloped land can be put to use?

So vast an expanse of undeveloped land has educational value and by arrangement with the state department of parks and recreation, Antioch/New England Graduate School has undertaken to design and evaluate ways to use the land for teaching purposes.

A broad topic for research is suggested by Pisgah, and that is the scientific and social aspects of land use generally. Using Pisgah as a focus, teachers from the towns and cities in the vicinity of the park undertook a year-long project to develop a curriculum based on the issues raised by land use decisions. Teachers from New Hampshire, Massachusetts, and Vermont researched land use problems, hiked the park, and consulted with experts about various aspects of teaching young people some of what is involved in deciding how to use the land -- whether privately or publicly owned. The product of this year is Yankee Lands: A Land Use Curriculum Project.

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# How to Use This Book

This is, in a way, a personal note from us to you -- from teachers to teachers.

From the beginning, Yankee Lands was thought of as a collection of activities teachers might select from to use in their classes in social studies and natural science. We knew the project could never be squeezed in its entirety between two covers of a book. At one time we thought of packaging the units in boxes to be loaned to schools. But as we worked through the six units it appeared that most of the materials could be put in the hands of teachers with only a few supplementary items made available on loan. That is what you have now -- a sourcebook of ideas most of which are accompanied by everything you will need to carry out the activities. Background information has been kept to a minimum because the social, legal, economic, and ecological aspects of land use issues is available in copious quantities elsewhere. We have listed some sources on page 2 and in the bibliography.

We have been careful to indicate with an "S" the pages of the sourcebook that will have to be duplicated if an exercise is to become a class activity. We have assumed that a thermofax-like machine is available to you for making overhead transparencies and ditto masters. We have indicated at the beginning of units and activities if audiovisual materials have been prepared to go with the written pages. We know that borrowing items is a nuisance and so we have kept that necessity to a minimum.

To arrange to use photographs, slides, tapes, reprints, books, or manuals, or to get some advice on any of these activities, you have only to contact:

Pisgah Project Coordinator
Environmental Studies Department
Antioch/New England Graduate School
103 Roxbury Street
Keene, New Hampshire 03431
Telephone: (603) 357-3122

A number of the activities are in the form of field exercises. Most of these can be carried out in a suitable area near your school, but some are specific to Pisgah State Park. For that reason we provide in the sourcebook two maps of the park. One, The Winter Trails Map, is on page 207. The other, bearing more detail, is in the pocket following page 290. (This latter map also doubles as the playing board for the Pisgah Simulation.) A highway map of New Hampshire will show the best route to use to reach the park entrances. No vehicles are permitted in the park itself (except for snowmobiles), but there is adequate parking near the entrances, especially at those points so indicated on the Winter Trails Map. It is not necessary to obtain permission to enter the park, but it makes good sense to let the park ranger know whenever a group is going into the park. The park ranger is Cecil Parker, telephone: (603) 352-0611.

To help you in selecting activities for your class we have catalogued them according to the fundamental skills they employ. Most of you will select activities for what they can contribute to your basic course material, but some may see these activities as a means to practice skills in the context of intriguing investigations. Either way, your students will be involved in the subject of land use.

## A Note on Values Education

A seventh grade science class was conducting an experiment involving goldfish. The experiment called for measuring the breathing rate of goldfish at different water temperatures. As the water temperature rose and the oxygen level decreased, some goldfish died. The students complained to the teacher: "I don't want to do this experiment. It's not fair to the goldfish."

"Just try it," encouraged the teacher. The experiment was outlined in the textbook and a valuable understanding of the variable of temperature, oxygen and water could be gained by the students.

Here also was a valuable opportunity for a discussion of life-depriving experiments. The students were involved and concerned. They wished to express their ideas, have their ideas recognized, and sort out their feelings.

A beautiful tree may be removed for a useful road. A wilderness area may be developed for a camping ground. Farmland may be sold for a shopping center. All of these situations are opportunities for values education.

Values education never means telling students - directly or indirectly - what they should hold to be right or wrong. It does mean the process of helping students articulate and examine their values in a receptive atmosphere. It means identifying societal and parental values, even identifying the teacher's values. By acknowledging (which is not the same as accepting or rejecting) the values of other groups, students are in a better position to clarify how they feel about an issue. Knowing how others feel will make it clear to students that a wide spectrum of values exists with respect ot most issues. In a democratic society the range of feelings is a source of strength and not of weakness as some critics may say.

A democratic society requires that its citizens make difficult, but intelligent decisions. Where should a school budget be cut? Where should a new industry be located? Should a naval shipyard be closed? What small African nation should receive aid? American citizens must be able to make moral judgments.

Values activities are sprinkled throughout the Pisgah Land Use Curriculum. A variety of techniques are suggested. Some call for a freewheeling discussion, some call for taking a stand, and some call for structured involvement.

Our objective is to connect the concrete with the abstract. By fostering involvement through values activities and simulated moral dilemmas, students will realize that land use decisions have as much to do with people and their values as with land.

Values education activities are listed in the Skills Cross Reference Chart.

A quick glance through these pages will reveal that the activities address some general aspects of land use. They are by no means limited to the land contained within or around Pisgah State Park. The materials are applicable to teaching about land use issues throughout New England and beyond. Pisgah and the communities surrounding the park have provided the models for these activities which, in turn, will serve teachers who wish to construct activities appropriate to their own localities.

Speaking frankly, we know we are presenting this sourcebook at an inauspicious time. Budget cuts, inflation and widespread retrenchment of school curricula do not encourage innovation. To many teachers and administrators this does not look like the time to take up something new. But, of course, land use issues are not new and this sourcebook contains activities that will help teach about the land use decision making process without adding any expense to and calling for only minimal revision in the teaching of standard subject matter.

While budgets for parks and schools are cut back, shopping malls and housing developments spread over former farms, forests, and wet lands. One way or another land use decisions are made. Soon our secondary school students will be the decision makers. The uninformed and unconcerned vote counts as much as that cast by the knowledgable and involved citizen. We believe that through looking at past, present, and future land use and by learning some of the scientific and social factors involved in deciding how to use the land, future voters will make more intelligent and more thoughtful decisions. To that end we present this project.

The efforts of the teachers who attended the many six-hour work sessions after full days of teaching and who spent several weekends sharing their know-how, generating ideas, and exploring new territory is hereby acknowledged with thanks. Whatever omissions or errors this curriculum project may contain, they cannot be laid to these dedicated professionals. Time alone has been our foe.

Howard Shapiro, Director

Yankee Lands: A Land Use Curriculum Project

August, 1980

# Skills Cross Reference Chart

### Language Arts

Nothing Succeeds Like Success (Unit 1)
"Successional Cards An Ecological Game" (Unit 1)
Land History: A Documented Case Study (Unit 1)
A Visit to Latham Cemetery (Unit 2)
Recreating a Community (Unit 2)
Death of Hardscrabble (Unit 2)
Valuing a Lifestyle (Unit 2)
Yesterday's Water Power (Unit 3)
Thank You Captain Dickinson (Unit 3)
Lumberman's Language (Unit 3)
Winter Sports Equipment (Unit 4)
Winter Recreation Survey (Unit 4)
Playing in the Winter Landscape (Unit 4)
Putting it all Together (Unit 6)

### Map Reading/Making

Land History: A Documented Case Study (Unit 1)
Cellar Holing (Unit 2)
Mapping Change (Unit 3)
Plotting Recreational Trails (Unit 4)
Pisgah Simulation (Unit 4)
Fact Gathering (Unit 6)

### Statistical Analysis

Recreating a Community (Unit 2)
Death of Hardscrabble (Unit 2)
Estimating Hydropower: A Field Activity (Unit 3)
Winter Recreation Survey (Unit 4)
Opinion Gathering (Unit 6)

### Mathematical

Taking a Plant Census (Unit 1)
Succession Through Community Sampling (Unit 1)
Cellar Holing (Unit 2)
Estimating Hydropower: A Field Activity (Unit 3)
Plotting Recreational Trails (Unit 4)

### Critical Thinking

"Successional Cards - An Ecological Game" (Unit 1)
Plants and Environment (Unit 1)
Succession Through Community Sampling (Unit 1)
Land History: A Documented Case Study (Unit 1)
Beavers, Blowdowns and Butternuts (Unit 1)
A Visit to Latham Cemetery (Unit 2)
Cellar Holing (Unit 2)
Recreating a Community (Unit 2)
Death of Hardscrabble (Unit 2)
Valuing a Lifestyle (Unit 2)
Yesterday's Water Power (Unit 3)
Thank You Captain Dickinson (Unit 3)
Winter Sports Equipment (Unit 4)

Plotting Recreational Trails (Unit 4)
Playing in the Winter Landscape (Unit 4)
Pisgah Simulation (Unit 4)

### Field Observation

Keying Plants (Unit 1)
Line Em Up: A Successional Sequence (Unit 1)
Habitat Hunt (Unit 1)
Plants and Environment (Unit 1)
Taking a Plant Census (Unit 1)
Succession Through Community Sampling (Unit 1)
Land History: A Documented Case Study (Unit 1)
Beavers, Blowdowns and Butternuts (Unit 1)
A Visit to Latham Cemetery (Unit 2)
Cellar Holing (Unit 2)
Estimating Hydropower. A Field Activity (Unit 3)
Plotting Recreational Trails (Unit 4)
Using the Winter Landscape (Unit 4)

### Values Clarification

Valuing a Lifestyle (Unit 2)
Comparing Energy Resources (Unit 3)
Winter Sports Equipment (Unit 4)
Playing in the Winter Landscape (Unit 4)
Jake Robbin's Dilemma (Unit )
Recreation in a Vanishing Wilderness - slide show (Unit 5)
Identifying the Issue (Unit 6)
Putting it all Together (Unit 6)

### Research Skills

Land History: A Documented Case Study (Unit 1)
A Visit to Latham Cemetery (Unit 2)
Cellar Holing (Unit 2)
Recreating a Community (Unit 2)
Yesterday's Water Power (Unit 3)
Thank You Captain Dickinson (Unit 3)
Lumberman's Language (Unit 3)
Comparing Energy Resources (Unit 3)
Winter Sports Equipment (Unit 4)
Winter Recreation Survey (Unit 4)
Identifying the Issue (Unit 6)
Fact Gathering (Unit 6)
Opinion Gathering (Unit 6)

# The Changing Yankee Forest: Ecological Succession

## Overview

History. It doesn't happen only to people. Just as the planet Earth has a history, so, too, does that thin layer of earth we think of as the land. It is the intent of this unit to help teachers and students examine the history of land from an ecological perspective. The major theme of the unit is that there is a predictable series of changes in the plants following human and natural disturbances of the land.

The unit activities are introduced by a 20-minute slide/tape show illustrating ecological succession in Central New England. There are a number of field and classroom investigations designed to demonstrate and follow up the ideas presented in the program. Students learn to recognize a forest as history in the making.

Unit activities, field trips, and materials are based on the geographical area in southwestern New Hampshire called Pisgah State Park. Pisgah offers remarkable opportunities for studying succession as well as many other facets of fresh water and terrestrial ecology.

With that having been said, it should be added that this unit can be adapted easily for use in any setting in New England.

The major, introductory activity, "The Changing Yankee Forest," is a slide/tape presentation that can be used profitably in any New England high school, urban or rural.

While the activities and materials in this unit are designed for use primarily in science classes, the intent of the curriculum as a whole is to encourage interdisciplinary study involving social studies, natural science, math, and English. The Changing Yankee Forest unit meshes well with the other units in the curriculum that emphasize social studies. Cemeteries and Cellar Holes (pp 113) deals with the agricultural history of Pisgah and the changes wrought upon the land by farming. Waterwheels and Lumbermen (pp 167) examines the history of logging in the area of Pisgah and its impact on the land. Both of these units elaborate the ideas introduced in this ecological succession unit. This unit, then, is designed as the springboard from which to dive into other units of the curriculum.

## Objectives

1. To help students develop and reinforce the concept of ecological succession.

2. To help students understand the function of man-made and natural disturbances in the process of succession.

3. To help students become familiar with the successional sequence of plant types that follow the occurrence of fire, the rise and fall of agriculture, logging practices, and the buildup and decline of beaver ponds.

4. To help students develop a vocabulary related to ecological succession.

5. To help students identify prominent successional plant species.

6. To help students interpret the history of a piece of land through the study of characteristic, indicator plants.

## Activities

*A slide/tape show, "The Changing Yankee Forest," and the preserved plants used in this unit are available from:*
*Environmental Studies Department, Antioch/New England Graduate School*
*Roxbury St., Keene, N.H. 03431*
*Tel. (603) 357-3122*

The goal of this unit is to bring students to the point of being able to look at a piece of land with an appreciation for the land's history. To get to that point, the slide/tape presentation provides the base. The "college bowl" exercise follows to establish the vocabulary and concepts. Then come a number of activities that put students in the field to see some of the concepts at work. The final, and specifically culminating, activity is one in which the students read the landscape as they reconstruct the history of a piece of land (and in some cases forecast its future use) - which is the point of teaching about succession.

"The Changing Yankee Forest" speaks for itself. The concept of ecological succession is presented in answer to the question, How did we come to have forests here in New England? Events that can interrupt the natural sequence of plant/animal communities are illustrated in subsequent series within the set. When the program is over, students will know that every forest and field has a history.

What students may not know well enough are some of the terms and concepts that are part of any discussion of ecological succession. The activity, "Nothing Succeeds Like Success", is drill disguised as fun. It will not only reinforce vocabulary, but it will stimulate discussion. In a single class period most students will be well prepared for their further exploration of land history.

What do you read when you read the landscape? One obvious thing to read is plants, but that presumes you know their names. Not many people do and that is why dichotomous keys are so useful. With the help of the "keying activity" students will quickly come to understand how a key works. Depending on the time and interest available for the study of succession, you may want to duplicate the Leaf Key (pp 88 ) and Twig Key (pp 103) for an excursion into field botany, but that is not essential to the rest of the activities in this unit.

A collection of plants is available for use in your class that has been developed specifically to help students relate plants to land history From features of the plants themselves, students are guided through a process of placing the specimens in sequence starting from the event that interrupted the succession.

At this point in the activities, you will need to decide whether to go directly to "Land History: A Documented Case Study" and conclude the unit or to take up one or more of the remaining field activities that are described here before going on to the case study.

The field work (much of it can be done on the school lawn) will introduce such concepts as plant distribution, soil structure, and adaptation - all ideas that enhance an appreciation of succession. On the other hand, if time is short, or if you are taking an historical approach, then the field activities may be passed over.

The field activities include exercises in determining density of organisms, relating the characteristics of organisms to their location in the environment, analyzing the characteristics of selected ecological sites, and comparing plant communities along a trail in Pisgah State Park.

"Land History: A Documented Case" is intended to help students apply the knowledge they have gained about ecological succession and to develop further their observational and investigative skills. It is a practical experience in reading the landscape.

## Slide/Tape Activity: "The Changing Yankee Forest"

### Introduction

To help you decide whether or not to obtain "The Changing Yankee Forest" for use in your classroom, and if you do, to help you decide how best to use it, the text of the slide/tape show is reproduced below.

The activities which follow presume a level of understanding of succession equivalent to that of the slide/tape program. If you ascertain that your students already have adequate comprehension in the concepts presented, you may decide to forego the program.

If, on the other hand, you elect to show the slides, you will receive the cassette tape of the narration and the slides will be in a carousel. If you need to put the slides in another carrier for projection, we ask that they be returned in the carousel in the proper sequence.

You might introduce the slide sequence by asking students how forests could have developed from scoured rocks and ledges left after the last ice age some 12,000 years ago. Solicit responses, but let the slides reveal the correct answer.

### Following Through

Discuss events that have occurred within the students' lifetimes that would have interrupted forest succession

# Script for "The Changing Yankee Forest"

Slide 1-Title Slide: The Changing Yankee Forest

2-9-Successional sequence.

10-Central New England - an area of diverse terrain. A landscape changed and changing by both people and nature.

11-An area covered by glaciers. Four times in the last two million years thick sheets of glacial ice from the Canadian Arctic covered this land and scoured away soil and rock.

12-12,000 years ago the most recent glacier melted and retreated leaving behind a legacy of exposed ledges and spreading a jumbled mixture of sand, clay and stone over the land.

13-As a result of this glacial action much of central New England is rough and rocky, full of stones farmers used to call "New England potatoes."

14-Central New England is a land of small mountains and hills; numerous lakes, ponds and marshes fill the lower places.

15-Many of the ponds and lakes occupy depressions carved by the glacier.

16-The forests of the area are as diverse as the terrain. Both coniferous evergreen trees and broadleaf hardwoods thrive here.

17-To the north of the area, in northern New Hampshire and Maine, there are great conifer forests, dominated by spruce and balsam fir.

18-To the south, in Connecticut, are hardwood forests of oak and hickory.

19-Central New England then is a mixing ground of these two forest types, a transition zone between the harsher conditions of northern New England and the milder conditions of the southern part of the region.

20-Title slide: Succession

21-But if this whole region was once covered by thousands of feet of ice how did our forests get here? This story is part of a process known as ecological succession, which is the theme of this program.

22-Succession starts after an ecosystem has been disturbed in some way. Glaciers disturbed all of New England by removing the forest. Can you think of other ways the forest can be disturbed?

23-Humans can cause forest disturbance by clearing land for agriculture...

24-...or by cutting trees for cordwood or timber.

25-Beavers, like humans, can cut trees and open up the forest.

26-Fire can be a cause of forest disturbance...

27-...as can strong winds.

28-Once disturbed the ecosystem starts to change in a predictable way until it reaches maturity.

29-Sometimes a severe disturbance will kill all of the plants in an area leaving just bare ground. At this point succession begins. The next 5 slides show the pattern of succession.

30-The first plants to invade the bare ground are herbaceous plants like wildflowers and grasses.

31-In time, woody shrubs and small trees start to grow.

32-The small trees grow into a dense young forest.

33-The forest ages and there is more open space between larger trees.

34-If the area is not disturbed a mature forest will develop.

35-Why do these changes take place? Each group of plants inhabits an area to which it is best suited and then, by growing, changes the kind of soil and the amount of moisture and light in the area. These changed conditions are better suited for a new and different group of plants which then can replace the first group.

36-Title Slide: Mature Forest

37-When the Europeans settled in central New England in the 1700's they found a patchwork of forests of different ages.

38-Despite the damage caused by fire and storms, the lack of major human disturbance had allowed sections of the forest to mature over a time span of several hundred years.

39-One of the most striking features of a mature forest is the size and age of its trees. These trees were over 500 years old.

40-Some species of trees commonly found in the mature forest are hemlock, sugar maple, yellow birch, and beech. These seldom live for more than 300 years.

41-The mature forest differs in several ways from the younger forest. The mature forest is always in the process of maintaining itself and replacing old and dying trees. There is a mixture of young, middle-aged and old trees.

42-The floor of the mature forest is generally open and easy to walk through.

43-Broken only by occasional fallen and decaying trees.

44-Decaying plant matter contributes to the development of a rich organic soil that slows soil erosion, holds large amounts of water...

45-and supports a diverse community of ferns such as maiden hair fern,

46-and wildflowers such as wood anemone,

47-andJack-in-the-Pulpit,...

48-Solomon's seal,...

49-and red trillium.

50-Throughout the 1700's and early 1800's settlers cleared the central New England forest to use for tilled land, pasture and meadow. They cleared river valleys first, but soon moved into the uplands.

51-At first these settlers grew crops and raised animals just for themselves and their families. These hardy people lived a relatively isolated life and made most of the tools and products they needed.

52-By the early 1800's agriculture in New England had reached its peak. Ninety percent of the people lived on farms, and in large parts of New England

80% of the land was cleared. The hilly, rocky uplands pastured over 4 million sheep. Sizable pieces of land were tilled and a system of roads connected farm and town.

53-However, this period of relative agricultural prosperity was short-lived and by 1850 many New Englanders were leaving their hill farms. Just why did these people leave? The building of the Erie Canal in 1825, and the coming of the railroad in the 1850's, helped to bring the downfall of the small New England farm. The railroad and canal linked the large, productive farms of the Midwest and the growing Eastern cities. Midwestern crops soon took over the Eastern markets.

54-During the 1800's mills and factories making a wide variety of products sprang up along the streams and rivers where water power was abundant. New England towns grew rapidly as many people moved from the unproductive farms to take jobs in the mill towns.

55-The Civil War of the 1860's took more young people away from the farms - young people who died in the war or decided not to return to their family farms.

56-The old farmhouses and barns fell into disrepair; they rotted and collapsed.

57-The abandoned fields began to undergo succession and started to become woodland.

58-A young forest of birch, poplar and red maple quickly returned.

59-Numerous cellar holes and many miles of stone fences in the woods stand in quiet testimony to a bygone era of widespread agriculture in New England.

60-The abandonment of the hill farms set into motion a series of changes known to ecologists as old field succession. Without man's disturbance, or that of his domestic animals, the cultivated land and pastures started to change into forests.

61-The first stage of this process finds herbaceous plants covering the open landscape.

62-Legumes, like the clover, are common pioneers of successional fields. One of their roles is to increase the soil nitrogen so that it will be able to support the larger plants that will later turn the field to forest.

63-The milkweed is another early invader of abandoned fields. Like many of the invading plants at this time, it has developed two ways to insure that it finds proper areas in which to set seed. One way is to produce hundreds of small seeds.

64-The other is to grow a silky attachment to each seed that acts like a sail. On windy days the seeds can be carried great distances, even to new fields. The milkweed produces so many seeds that some are bound to land in open environments. The majority do not.

65-The thistle is another herbaceous plant that produces many seeds carried by the wind.

66-A few years after the area has been abandoned, woody shrubs and sapling trees start to invade the old fields.

67-Steeplebush is a common woody shrub of old field...

68-as is its close relative, the meadowsweet.

69-Commonly found with these shrubs are the berry bushes, the most abundant and antagonizing to the walker being the blackberry. Unlike the previous herbaceous plants that used wind to spread their seeds, these woody shrubs usually rely on mammals and birds to eat their fruit and carry the seeds to other areas where they will be deposited with the animal's droppings.

70-Young trees, such as pine, birch, maple, poplar and cherry are also found with the shrubs. These trees grow faster than the herbaceous plants and shrubs. In time they grow over the lower plants, killing them by blocking their needed sunlight.

71-When the herbaceous plants first invaded the field they found one environment; however, while growing in the field they changed the environment. One way in which they did this was by adding organic material to the soil. This made a nice seed bed for many of the trees which eventually grew over the herbaceous plants. So succession occurs because one group of plants changes its environment so much that another group of plants invades and takes over.

72-Once again we are back to a field undergoing early successional changes. Can you tell whether this was originally pastureland or cropland? The clue is the presence of many rather large juniper shrubs. These tell us that this field was used for pasturing animals.

73-Juniper is one of the few woody plants that is not eaten by domestic animals. It grows quite slowly in its early years and is often shaded by faster growing plants. It is usually uncommon in fields unless they have been pastured.

74-Domestic animals give juniper the head start it needs by eating all of the other plants around it. Once established it can grow quite fast.

75-It will continue to grow until it is overshaded by trees, in this case a white pine.

76-Junipers, like most early successional plants, need sunlight to thrive...

77-and without it they die.

78-In time an old field, whether originally cultivated or pastured, will grow to forest, in this case a forest of white pine. White pine stands are very common on old field sites, because old fields provide a good seed bed and lots of needed sunlight.

79-Title Slide: Logging is another way that man disturbs the land.

80-The New England hill farms which were abandoned in the mid-1800's, produced a valuable crop of white pine by the late 1800's.

81-During the early years of the twentieth century, hard-working crews of loggers moved in with axes and cross-cut saws to harvest the trees. The misfortune of New England agriculture turned into the heyday of New England logging.

82-In many places the loggers clear-cut the land, taking every useable pine and leaving behind some of the less valuable young hardwoods.

83-Millions of board feet of lumber left the New England woods each year via horse-drawn sleds.

84-This wood was used for boxes, toys, furniture, paper and other products.

85-Logging left the forest floor covered with piles of slash, and numerous stumps. Scraggly hardwoods and dead pines were scattered here and there.

86-However, the forest rapidly began to recover. Sprouts from the stumps of hardwood trees exposed to sunlight began to grow.

87-Within 15 years a young forest had developed.

88-This young forest is dominated by fast-growing trees such as gray and paper birch, pin cherry, and poplar.

89-As the forest matures these fast growing, short-lived species begin to slow down...

90-and die.

91-The red oaks, ash and maples maintain their steady growth rate and eventually dominate the canopy of the forest.

92-Given enough time, the middle aged forest of oak, ash, and red maple will develop into a mature forest of beech, yellow birch and sugar maple.

93-Thus far, we have looked at humans as an agent of disturbance in our New England forests.

94-However, there are other means by which successional patterns can be started in our forests; for example, by the beaver.

95-Beaver dam streams, creating ponds that flood the surrounding forest. Trees are chewed down and the branches are stripped of bark.

96-The bark is eaten and the naked branches are then used with mud to build the beaver lodge.

97-The sticks are also used with larger logs to create and maintain the dam. If the dam breaks, the beaver will repair it quickly. The sound of running water is believed to stimulate their dam building activities.

98-Whenever dead trees are seen standing in a pond, it's most likely the work of beaver. But why do beaver create their ponds? The main reason is that they are protected from many predators in their watery home.

99-During the summer they store a winter's supply of food sticks under water in the pond's muddy bottom. If the pond is not deep enough, the ice will freeze to the bottom and the beaver will starve.

100-In time the standing dead trees fall and the pond fills with silt and becomes marshy.

101-Around the edges of the pond the sign of the beaver is evident. With their strong jaws they chew through and cut down large trees, like this red oak, to get at the top branches which have tastier, young bark.

102-Beaver are awkward on land and do not like to travel far in search of food trees. They often clear the edges of their ponds of hardwoods, letting the conifers that they do not like to eat invade the openings.

103-When they have finally exhausted the food supply that borders the pond, they migrate to another area, create a new pond, and start to change the forest landscape once again. Meanwhile, the old pond's dam breaks from lack of repair, and the water level drops. Around the barren edges of the pond herbaceous plants develop and succession starts.

104-In time, the total breakdown of the dam will cause the pond to drain. In place of this pond a meadow will develop with a stream flowing through it. Eventually the meadow will succeed to forest. In many years, if there is an adequate source of food trees, another beaver may dam the stream and start the whole process over again.

105-Fire is another agent of disturbance in forests.

106-This is a good example of a fire that is burning the whole forest, including the tree tops. It is called a crown fire.

107-Crown fires usually occur in dense forests. Not all forest fires are like this. Some burn only the forest floor.

108-Since New England forests are for the most part young and dense, crown fires would tend to be more common here.

109-Forest fires often burn in a haphazard pattern leaving unburned areas as refuges for wildlife and seed trees. The result is a mixture of disturbed and undisturbed areas.

110-Very hot crown fires such as this one...

111-burn almost all of the organic material found in the soil; however, even in a fire as hot as this the roots of many hardwood trees...

112-are not destroyed and send up root sprouts the following spring to start the successional process.

113-In coniferous forests, the trees cannot send up root sprouts, so succession starts with herbaceous plants.

114-Fire weed brightens recent burns. Its name is derived from its ability to grow in burned areas. The tiny seeds of fire weed need to begin their growth on the bare soil that is left behind by fires.

115-Along with fire weed are many other herbaceous plants that start to invade the burned area. The plants for the most part are the same ones that invade cultivated land. Some years after the fire the dead trees become bleached gray by weathering.

116-After a fire the plants often grow vigorously, because the fire returns nutrients to the soil that had been stored in the forst. On steep slopes where soil erosion could occur, these nutrients can be washed away, slowing succession. Once the herbaceous plants are established, they create conditions favorable for the invasion of trees and shrubs, just as in old field succession.

117-Once the woody plants start to grow they quickly overtake the herbaceous plants. Soon they dominate the successional process.

118-As the new forest matures, the signs of fire will be slowly lost until there will be little left to indicate that the forest had once burned.

119-Due to many kinds of disturbances our New England Forests are constantly in a state of change. What if this were not the case and all of our forests reached maturity? Would we lose many different types of ecosystems and the plants and animals that live in them?

120-Ecological diversity is important in maintaining a healthy world. Both natural and human disturbances help to create the varied landscape we find here in central New England.

121-End.

# Activity: Nothing Succeeds Like Success

## Introduction

This game, in the format of General Electric College Bowl, is designed to reinforce ecological concepts and terms used in the slide/tape presentation, "The Changing Yankee Forest."

Even for students with a knowledge of succession, some of the material in the presentation may not be understood or may at first be unclear. The game will reinforce the material through an oral activity in which a whole class can participate.

## Playing the Game

Divide the class into teams of three to five students. Arrange the teams so that everyone can see everyone else. Decide on a method for identifying the team that responds first to a question. A student can be designated the referee and assigned to recognize the responding team. A team's response might be determined by the use of raised hands, a buzzer system, lights, bells, or whatever can be devised conveniently.

The game comes with a stack of question cards and a mural depicting forest succession. The mural is graduated. When a team answers a question correctly, points are awarded and that team's marker is advanced along the graduated scale. Hang the mural where everyone can see it. Shuffle the cards, and you are ready to play.

Select a question card. Read the point value and question. The first team to respond is given the opportunity to answer the question. If the answer is correct, the team's marker is advanced on the mural the appropriate number of points. If incorrect, the team is penalized and the marker is moved back as far as the point value of the item missed (unless they have not advanced that far, in which case they stay at the beginning or go back as far as they had advanced).

The answers on the cards are not hard and fast. If the response shows that the concept or term is understood, the points should be awarded. However, if the response leaves out pertinent information, you (the teacher or the reader) should mention the missing information.

The game is finished either when all the cards have been read, or when the winning team reaches the end of the successional mural.

3 points

Why is juniper usually only found in areas that were once pastured?

Answer: It is very slow growing in its early years and needs domestic animals that don't eat it to keep other plants from growing up around and kill it by blocking the needed sunlight.

3 points

What type of forest develops after the clear cutting of white pine?

Answer: Hardwood forest.

4 points

What are four characteristics of a mature forest?

Answer: Large old trees, trees of all ages, open understory, rich organic soil, lush wildflowers, decaying trees.

3 points

Why types of trees are usually found around the edges of old beaver ponds?

Answer: Conifers

**SUCCESS CARDS**

**SUCCESS CARDS**

**SUCCESS CARDS**

**SUCCESS CARDS**

3 points

Give two reasons why the New England hill farms were abandoned in the middle of the 1800s.

Answer: The Erie Canal and the railroad opened the markets of the East to the cheaper agricultural products of the west.
The mills and factories offered the advantages of cash wages and urban living.
Young men who left during the Civil War moved to new areas.
People wanted more than the self sufficiency that the small farm provided.

5 points

Name three common trees of the young forest and three common trees of the mature forest.

Answer: Young forest - poplar, pine, cherry, paper birch, red maple, grey birch.
Mature forest - sugar maple, yellow birch, beech, hemlock.

5 points.

How can soils be benefitted and damaged by fire?

Answer: Benefitted by release of nutrients locked in forest returned to soil.
Damaged by soil erosion.

3 points

What was the most commonly logged tree in central New England at the turn of this century?

Answer: White pine

**SUCCESS CARDS**

**SUCCESS CARDS**

**SUCCESS CARDS**

**SUCCESS CARDS**

3 points

Define: Glacier

Answer: Thick sheet of ice that slowly erodes the earth's surface through grinding by moving over it. When it melts it deposits sand, large rocks and till.

3 points

Name three ways you could identify a beaver pond?

Answer: Standing dead trees, dam made of sticks, beaver lodge, stumps showing beaver cutting, pond bordered mostly by coniferous trees.

4 points

Define: Mature forest

Answer: It is the forest that has developed at the end of the successional process. It is characterized by large old trees, rich soil, open understory and trees of all ages.

3 points

Define: Disturbance

Answer: An event that counters the process of succession by disrupting the ecosystem in some way.

**SUCCESS CARDS**

**SUCCESS CARDS**

**SUCCESS CARDS**

**SUCCESS CARDS**

3 points

Define: Organic soil

Answer: A soil that has a good amount of decayed material from previously living organisms.

3 points

Define: Herbacious

Answer: Any vascular plant that doesn't have woody tissues, includes all grasses and wildflowers.

3 points

Compare the ability of hardwoods and conifers to send up root sprouts.

Answer: Most hardwoods can send up sprouts from their roots while few conifers can.

4 points

What are the three major types of forests found in New England?

Answer: In southern N.E.oak-hickory forests, in northern N.E. spruce and fir forests, in central N.E. mixed hardwood and coniferous forests.

**SUCCESS CARDS**

**SUCCESS CARDS**

**SUCCESS CARDS**

**SUCCESS CARDS**

3 points

Name four types of forest disturbance.

Answer: Fire, logging, wind, beaver, agriculture, insect.

4 points

Define: Old field succession

Answer: The process by which either cultivated or pasture land slowly develops into a field dominated by shrubs and sapling trees and finally a forest.

3 points

Define: Pioneer plants

Answer: Those plants that invade recently disturbed areas that have no plant cover.

3 points

Why do beaver build ponds?

Answer: So that they can be protected from predators and so that they can store a winter's food supply.

**SUCCESS CARDS**

**SUCCESS CARDS**

**SUCCESS CARDS**

**SUCCESS CARDS**

K

4 points

Define: Legumes

Answer: Any plants that are members of the pea family. They have the important ability to add nitrogen to the soil.

4 points

Define: Ecological dominant

Answer: The plant or plants that if removed from an ecosystems would cause the greatest amount of change. They are usually the most common or largest individuals.

3 points

Define: Clear cut

Answer: A method of cutting forest timber where all the trees are cut in a specific area.

3 points

Define: Coniferous

Answer: Any woody plant that has needles for leaves.

**SUCCESS CARDS**

**SUCCESS CARDS**

**SUCCESS CARDS**

**SUCCESS CARDS**

3 points

Define: Slash

Answer: The tops and branches of trees that are left on the ground after a logging operation.

4 points

Define: Transition zone

Answer: An area between two different types of ecosystems, that is inhabited by species from both, plus some found only in the transition zone.

5 points

Define: Ecological diversity

Answer: Refers to the number of different species in an ecosystem or region. Decreasing diversity is related to an ailing ecosystem or the ecology of a region.

5 points

Define: Ecosystem

Answer: A natural community of plants and animals and the environment they exist in. Can be a field, forest, pond, etc.

**SUCCESS CARDS**

**SUCCESS CARDS**

**SUCCESS CARDS**

**SUCCESS CARDS**

4 points

Why do milkweed and other early field plants produce so many seeds that can travel great distances?

Answer: To find newly disturbed areas to grow in because successional fields change quickly and these plants soon will not be able to grow there.

3 points

Define: Cultivation

Answer: The continual disturbance of the land for the purpose of growing crops.

3 points

Why are white pine forests common on old field sites?

Answer: Old fields are good seed beds for white pine and other trees, but white pine is one of our fastest growing trees out competing other trees for needed sunlight.

4 points

Describe how central New England looked in 1840.

Answer: Most of the land cleared for farms, forests restricted to steep, rocky slopes, much sheep farming, many small towns.

**SUCCESS CARDS**

**SUCCESS CARDS**

**SUCCESS CARDS**

**SUCCESS CARDS**

3 points

Define: silt

Answer: Very fine particles carried by streams and rivers that are deposited in ponds and lakes sometimes eventually filling them.

3 points

Define: Forest canopy

Answer: The highest layer of leaves formed by the largest trees in the forest.

5 points

Define: Ecological succession

Answer: The process by which groups of plants alter the physical nature of their environment allowing a new group of plants to invade and eventually dominate the environment. This process is always started by some form of disturbance and if left undisturbed will result in a mature ecosystem that maintains itself.

3 points

Define: Crown fire

Answer: A forest fire that consumes the whole forest including the tops of the trees.

**SUCCESS CARDS**

**SUCCESS CARDS**

**SUCCESS CARDS**

**SUCCESS CARDS**

3 points

Which ecosystem would be easiest to walk through, an old field full of brambles, a very young forest, a 60 year old forest or a mature forest?

Answer: Mature forest.

3 points

What are three things the glaciers left behind?

Answer: Till, sand, rocks, exposed ledges, lakes, rounded hills.

5 points

Why does succession occur?

Answer: Each group of plants changes the physical nature of their environment allowing plants that previously could not grow to invade. They out compete the earlier plants and change the environment further allowing new plants to invade.

**SUCCESS CARDS**

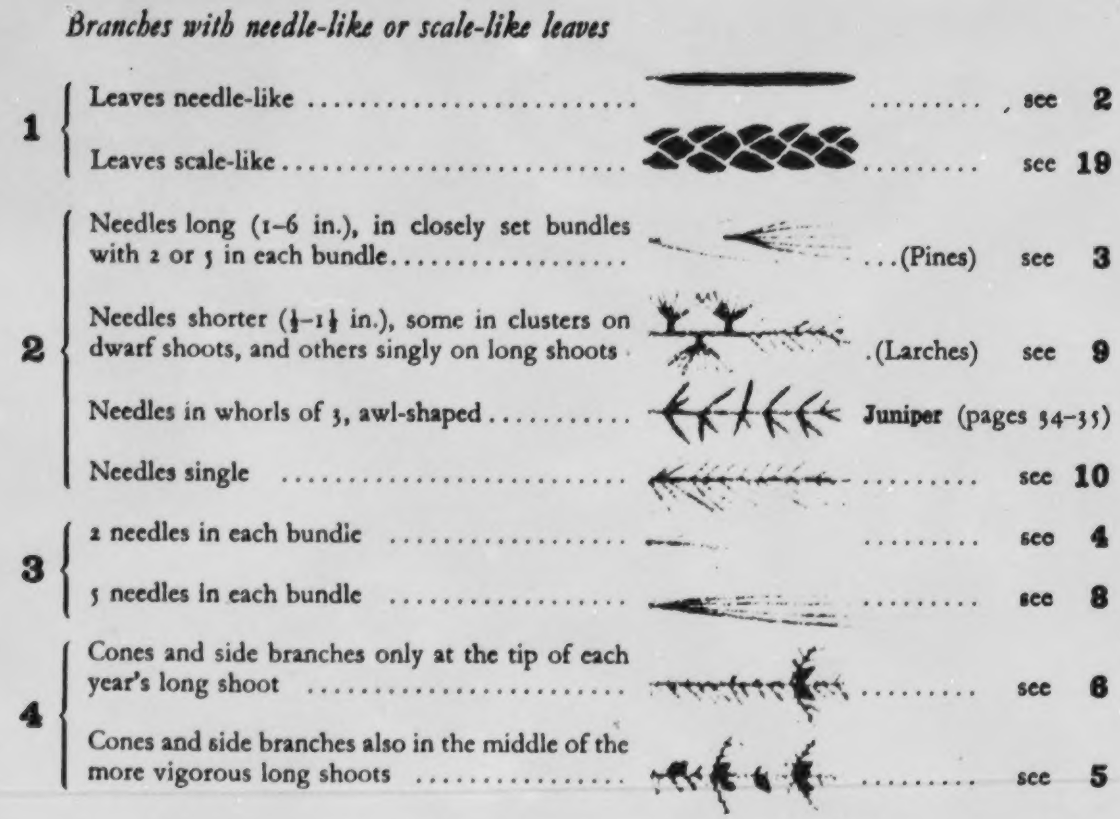
**SUCCESS CARDS**

**SUCCESS CARDS**

**SUCCESS CARDS**

TWO "SUCCESSION CHARTS" REMOVED DUE TO OVERSIZE.

# Constructing Keys



*Branches with needle-like or scale-like leaves*

| | | |
|---|---|---|
| 1 | Leaves needle-like | see **2** |
| | Leaves scale-like | see **19** |
| 2 | Needles long (1–6 in.), in closely set bundles with 2 or 5 in each bundle | (Pines) see **3** |
| | Needles shorter (½–1½ in.), some in clusters on dwarf shoots, and others singly on long shoots | (Larches) see **9** |
| | Needles in whorls of 3, awl-shaped | **Juniper** (pages 34–35) |
| | Needles single | see **10** |
| 3 | 2 needles in each bundle | see **4** |
| | 5 needles in each bundle | see **8** |
| 4 | Cones and side branches only at the tip of each year's long shoot | see **6** |
| | Cones and side branches also in the middle of the more vigorous long shoots | see **5** |

Example of an identification key taken from *Trees and Bushes* by Vedel and Lange, published by Methuen

A biological key is simply information arranged in such a way that it can be used to identify unknown specimens.

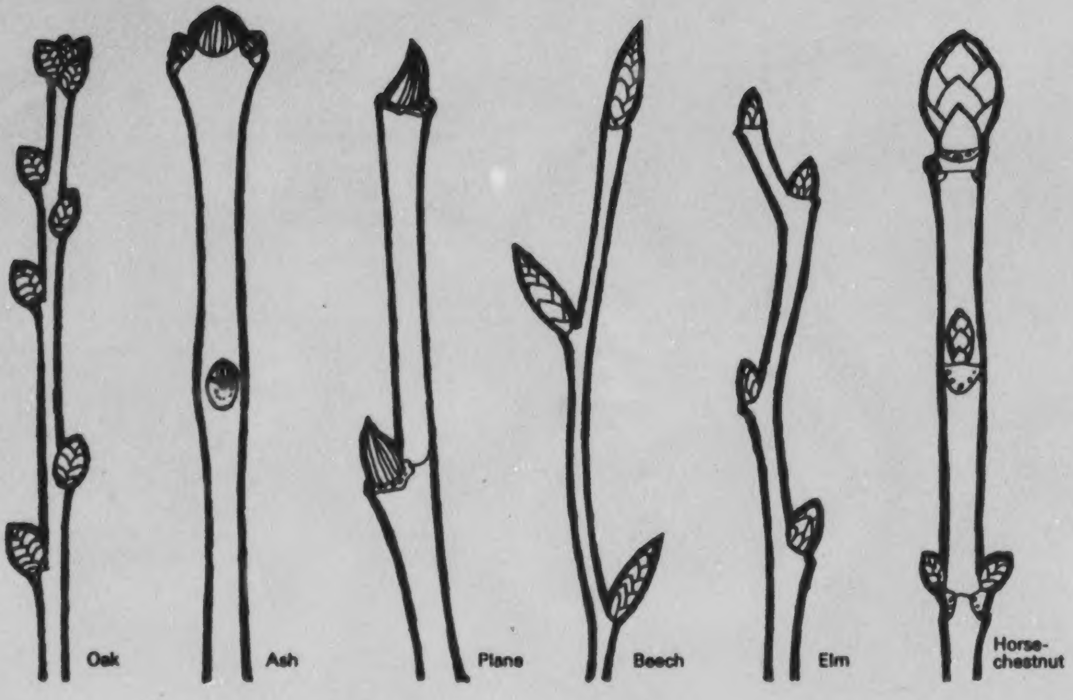
Most keys work by asking pairs of questions about the specimen and according to the answer the reader gives, they direct him by number to other questions until eventually he reaches the correct identification. For brevity the questions are usually implied ones written in the form of statements.

Now keys may seem complicated things to include in a book concerned with young children. Certainly most published varieties are beyond their understanding, because they use complex language and demand very detailed observation. But the *principle* of key construction has great relevance because keys are based on the systematic arrangement of information and any child who has experience of sorting and recording is quite capable of making a key, however simple it may be.

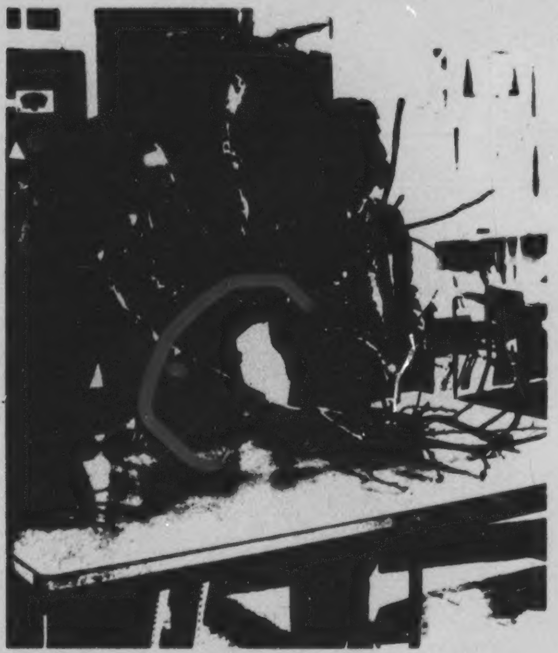
The value of the work lies in the experience of classifying and organising data; it will also help children's later use of complex keys by giving them familiarity with basic principles. So consider introducing some key-making activities, but be sure they arise from things children are involved in, or else the work is little more than an academic exercise.

Activities of the kind described on page 39 could provide a starting point, or children might be stimulated to make keys through seeing their teacher use one. Many are intrigued that an apparent 'mumbo-jumbo' of words and figures can provide the name of something unknown, and their interest is aroused.

Any tree material could be used for making keys, but spring twigs are possibly the best starters because they are easy to handle and are quite distinct. Whatever the children use, make sure they begin with a limited number of things that have obvious observable differences. We shall take six common twigs to illustrate key making.



## Making keys by removing one twig at a time



### Getting information

Let children examine their collection of twigs and remove one twig they consider to be very obviously different from the others. They should make a note of why they decided it was different.

Next they remove another twig, then a third and so on until they are left with six separate twigs, each of which they recognise by some special feature.

The chart on the right shows the pattern of the work and the features chosen by one group of children.

Children will take time to arrive at such a scheme; they will need lots of discussion and trial and error working. But once they are satisfied they have a satisfactory plan for separating out their twigs they are ready for the next stage.

| | | |
|---|---|---|
| The original collection<br>Oak<br>Elm, Beech<br>Horse-chestnut<br>Plane<br>Ash | First twig is removed: because it has sticky buds | Horse-chestnut |
| Collection after first removal<br>O<br>E B<br>P<br>A | Second twig is removed: because it has black buds | Ash |
| Collection after second removal<br>O<br>E B<br>P | Third twig is removed: because it has lots of buds at the tip | Oak |
| Collection after third removal<br>E B<br>P | Fourth twig is removed: because its buds are long and thin | Beech |
| Collection after fourth removal<br>E P | Fifth twig is removed: because it has a scar all around the bottom of the bud | Plane |
| Last remaining twig<br>E | | Elm |

## Organising the information

Help the children recall what they did to separate out each twig and get them to write out some directions that makes the reader do the same thing.

It is best to give them a format for their work to help them record things systematically. Try something along the following lines:

Which was the first twig you removed? *Horse-chestnut.*

Why did you remove it? *Because it had sticky buds.*

What will you write to make sure someone else removed the horse-chestnut twig first? *Feel the buds to see if they are sticky.*

Which twigs are left? *O A E B P.*

Now help them put their answers into a key-like construction. For example:

First *feel the buds.*
Are they sticky?
Yes . . . It is horse-chestnut
No . . . It might be O A E B P

They now have a pattern they can repeat for the other twigs and so produce a simple key.

First *feel the buds.*
Are they sticky?
Yes . . . It is horse-chestnut
No . . . It might be O A E B P

Next *look at the colour of the buds.*
Are they black?
Yes . . . It is ash
No . . . It might be O E B P

Next *look at the buds at the tip of the twig.*
Are there more than three in a group?
Yes . . . It is oak
No . . . It might be E B P

and so on.

Let other children try out the key. Does it work? Some may now be ready to extend their work, substituting number guides for the boxed information. For example:

1. *Feel the buds.*
Are they sticky?
Yes . . . It is horse-chestnut
No . . . Go to: 2

2. *Look at the colour of the buds.*
Are they black?
Yes . . . It is ash
No . . . Go to: 3

3. etc.

There are two advantages to this approach:

*a.* The children *gradually* build up the idea of a key. This is important for real understanding.

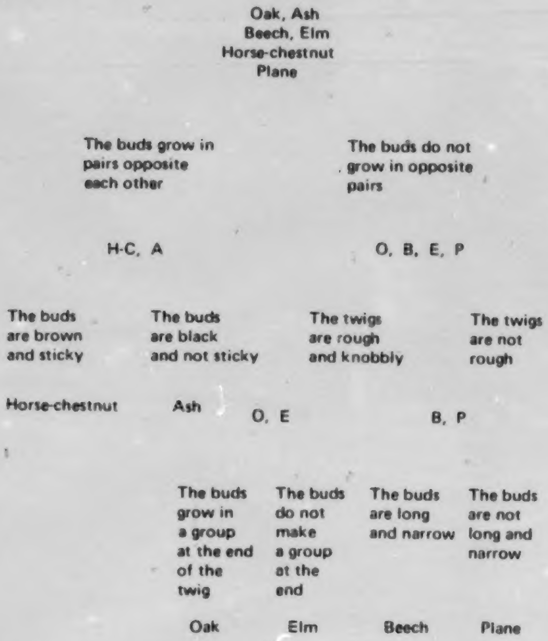
*b.* The statements in the key are introduced so that decisions can be made in answer to questions on directed observation. This helps to establish them as statements requiring decision.

Children who have made this kind of key might now be ready to use a simple printed key* but probably they will first need experience of making keys by systematically excluding groups of specimens.

**For example:* Winter Key to Some Common Deciduous Trees, *School Natural Science Society Leaflet No. 22.*

## Making keys by removing groups of things

Children will find these keys more difficult because they involve a more complex handling of information. Instead of removing one twig at a time they need to divide their twigs into two groups and then systematically divide each subgroup. Let them explore ways of doing this and so get information for making a key. The chart on the next page, top left, shows how some able top juniors made their groupings. Other children might have other ideas.


Oak, Ash
Beech, Elm
Horse-chestnut
Plane
The buds grow in pairs opposite each other
The buds do not grow in opposite pairs
H-C, A
O, B, E, P
The buds are brown and sticky
The buds are black and not sticky
The twigs are rough and knobbly
The twigs are not rough
Horse-chestnut
Ash
O, E
B, P
The buds grow in a group at the end of the twig
The buds do not make a group at the end
The buds are long and narrow
The buds are not long and narrow
Oak
Elm
Beech
Plane

When they have worked out a way of subdividing their collection they are ready to organise their ideas into a key-like form. Build on their earlier experience and help them decide what statements they will use to guide the reader. For example, the first grouping in the chart could be recorded as:

Buds grow in opposite pairs on the twig.

Buds do not grow in opposite pairs.

Initially they will have problems in numbering their key but if, through earlier work, they understand the guiding function of numbers they will soon see the need to 'number out' systematically successive information about the groups. They will find things easiest if they first 'number out' the subgroup with the fewest subsequent divisions, which in our example is horse-chestnut and ash.

Here is how the procedure works:

1. Buds grow in opposite pairs on the twig . . . 2
   Buds do not grow in opposite pairs . . . (*3*)
   *This statement is not numbered until the twigs relating to 2 are keyed down further.*

2. Buds brown and sticky . . . Horse-chestnut
   Buds black and not sticky . . . Ash
   *Now they have accounted for all the twigs relating to 2 and can use the next available number, in this case 3, to number the unnumbered statements about twigs that do not have opposite buds. They can then go from there.*

3. Twigs rough and knobbly . . . 4
   Twigs not rough and knobbly . . . (*5*)
   *Left unnumbered until 4 is keyed out.*

4. Buds in a group at the end of the twig . . . Oak
   Buds not in a group at the end . . . Elm

5. etc.

Now they can confidently approach printed keys to identify *unknown* twigs, though they may need help with some of the technical terms used. This gives a tremendous sense of achievement.

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# Activity: Line 'Em up: Successional Sequences

## Introduction

In order to study ecological succession in New England, it is necessary to know some of the common successional sequences and the plants that form them. "Line 'em Up" will will reinforce material covered in the "Changing Yankee Forest" slide program, as well as, prepare students to go into the field by helping them with their plant identification.

The activity involves arranging mounted plant specimens into sequences that are similar to successional patterns that occur in New England. To identify the plants, the students will use a dichotomous key. If your class has little experience using keys, the preceding activity is a good one to introduce how keys work.

## Materials

Five sets of mounted plants; 10 copies of the key.

## Activity

Thirty-four plants common to our area have been chosen to form five separate successional sets. The number of plants per set ranges from 12-15, so many of the plants occur in more than one sequence. All of the plants are mounted and covered with transparent contact paper to protect them during handling. However, since these materials will be used by many people, please inform your students to handle them carefully.

Divide your class into five groups. Give each group one set of plants and at least two keys. Each plant set is color coded so they cannot become confused. Let them have approximately 15 minutes to identify all the plants in their set by use of the key. After they have identified their plants, have them arrange the plants into a sequence they think best represents a successional pattern. At the same time they should also try to decide what type of disturbance initiated their successional sequence.

Each of the plant sets is related to a specific type of disturbance. The blue set was generated by the abandonment of a beaver pond, the brown set by cultivation, the green set by the halting of pasturing, the yellow set by logging, and the red set by fire. You should let them know the five types of disturbance, and have them decide which is most appropriate. They should be able to support their choice. When each group is finished line up all of the sequences in the middle of the room and discuss their differences and similarities.

## Discussion

You can start your comparison by pointing out that all the sequences start with fast growing annuals. These plants all have minimal root systems.

Since they will inhabit the area for only the summer, their strategy is to put all their energy into leaf and seed production. These annuals are then replaced by larger annuals and perennials that plan to inhabit the area for a few years. Accordingly, these perennials have more extensive root systems for gathering nutrients and storage. Next come the woody shrubs, which outcompete the herbacious annuals and perennials. Of course, their root systems are even more extensive because they will inhabit the site for a number of years. The woody shrubs are followed by the early successional trees which form a young forest. Given enough time, these young forest trees are replaced by mature forest trees such as Beech, Yellow Birch, and Sugar Maple. The mature forest trees have the most extensive root systems of all because they can exist in the forest for two to three hundred years.

Although all the sequences move from annuals to perennials and on to woody plants, each sequence's species are somewhat different. Within each sequence are one or more species that indicate the type of disturbance that initiated the sequence. Below are the indicator plants for each sequence:

Abandoned Beaver Pond - wet sited herbs like sedges, iris and cattails invade drained ponds and exposed pond margins.

Cultivation - lambs-quarters and ragweed do well in exposed soil but wouldn't occur in a pasture where they would be grazed.

Abandoned Pasture - low growing herbs like cinquefoil, hawkweed and sheep sorrel grow along the ground avoiding being grazed, also juniper needs grazing to give it a head start so that it is not overgrown in its slow growing early years by other plants.

Logging - the presence of woodland herbs such as woodland astor, rattlesnake root and false solomon seal indicate that the forest was once present.

Fire - Fireweed is a good indicator of burned areas although it can occur in areas disturbed by some other means.

## Correct Plant Sequences

| Beaver (blue) | Cultivation (brown) | Pasture (green) | |
|---|---|---|---|
| Jewel Weed<br>Sedge | Lambs-quarters<br>Ragweed<br>Grass<br>Clover | Hawkweed<br>Sheep Sorrel<br>Grass | Fast Growing Annuals |
| Iris<br>Cattail | Goldenrod<br>Milkweed | Cinquefoil<br>Goldenrod | Perennials and Large Annuals |
| Spirea<br>Alder | Spirea<br>Blackberry | Spirea<br>Juniper | Woody Shrubs |
| White Pine<br>Paper Birch<br>Red Maple | White Pine<br>Gray Birch<br>Aspen<br>Red Maple | White Pine<br>Gray Birch<br>Red Maple | Early Successional Trees |
| Beech<br>Yellow Birch<br>Sugar Maple | Beech<br>Yellow Birch<br>Sugar Maple | Beech<br>Yellow Birch<br>Sugar Maple | Mature Forest Trees |

| Logging (yellow) | Fire (red) | |
|---|---|---|
| Grass | Grass<br>Clover | Fast Growing Annuals |
| Woodland Astor<br>Rattlesnake Root<br>False Solomon Seal | Mullien<br>Fireweed | Perennials and Large Annuals |
| Blackraspberry | Blackberry | Woody Shrubs |
| Red Maple<br>White Ash<br>Black Cherry<br>Red Oak<br>Parer Birch | White Pine<br>Aspen<br>Red Maple<br>Paper Birch | Early Successional Trees |
| Beech<br>Yellow Birch<br>Sugar Maple | Beech<br>Yellow Birch<br>Sugar Maple | Mature Forest Trees |

# Line 'Em Up Key to Successional Species

| | | |
|---|---|---|
| 1 | Herbacious plants, lacking woody parts | |
| 2 | Monocots, with narrow leaves and leaf veins running parallel to leaf edge | |
| 3 | Leaves branching off main stem | FALSE SOLOMON SEAL |
| 4 | Leaves wider than one inch | |
| 4 | Leaves narrower than one inch | |
| 5 | Spiny seed cluster at end of stem | SEDGE |
| 5 | No seed cluster at end of stem | GRASS |
| 3 | Leaves branch from base of plant | |
| 6 | Leaves have noticeable mid-rib vein | IRIS |
| 6 | Leaves do not have noticeable mid-rib | CATTAIL |
| 2 | Dicots, veins do not parallel leaf edge | |
| 7 | Compound leaves, more than one blade per leaf stem | |
| 8 | Having three leaflets or blades | CLOVER |
| 8 | Having five or more leaflets | COMMON CINQUEFOIL |
| 7 | Simple leaves, one blade per leaf stem | |
| 9 | Leaves dissected, notches cut almost to mid-rib | RAGWEED |
| 9 | Leaves not dissected | |
| 10 | Leaf edge smooth, no serrations or undulations | |
| 11 | Leaves fuzzy | |
| 12 | Leaves more than one inch wide | MULLEIN |
| 12 | Leaves less than one inch wide | HAWKWEED |
| 11 | Leaves not fuzzy | |
| 13 | Leaves more than one inch wide | MILKWEED |
| 13 | Leaves less than one inch wide | SHEEP SORREL |
| 10 | Leaf edge serrated or undulating | |
| 14 | Leaves heart shaped | ASTER |
| 14 | Leaves not heart shaped | |
| 15 | Leaves triangular shaped | RATTLESNAKE ROOT |
| 15 | Leaves not triangular shaped | |
| 16 | Plants with yellow or or orange flowers | |
| 17 | Flower cluster at top or plant | GOLDENROD |
| 17 | Flowers occur singly | JEWEL WEED |
| 16 | Flowers not yellow or orange | |
| 18 | Flowers pink | FIREWEED |
| 18 | Flowers green | LAMBS-QUARTERS |

| | | |
|---|---|---|
| 1 | Plants with woody parts | |
| 19 | Conifers, having needles for leaves | |
| 20 | Needles longer than one inch | WHITE PINE |
| 20 | Needles shorter than one inch | JUNIPER |
| 19 | Deciduous plants with broad leaves | |
| 21 | Compound leaves, more than one blade per leaf stem | |
| 22 | Leaflets radiate from one point, thorns present | BLACKBERRY |
| 22 | Leaflets arranged on both sides of central stem | |
| 23 | Thorns present | BLACKRASPBERRY |
| 23 | Thorns absent | WHITE ASH |
| 21 | Simple leaves, one blade per leaf stem | |
| 24 | Leaves oppositely arranged on stem | |
| 25 | Notches of leaves V shaped | RED MAPLE |
| 25 | Notches of leaves U shaped | SUGAR MAPLE |
| 24 | Leaves alternately arranged on stem | |
| 26 | Leaves lobed with notches | RED OAK |
| 26 | Leaves not lobed | |
| 27 | Leaves triangular in shape | GRAY BIRCH |
| 27 | Leaves not triangular in shape | |
| 28 | Leaves heart shaped | ASPEN |
| 28 | Leaves not heart shaped | |
| 29 | Mid-rib on underside of leaf fuzzy | BLACK CHERRY |
| 29 | Mid-rib on underside of leaf without fuzz | |
| 30 | Leaf base narrower than leaf top | SPIREA |
| 30 | Leaf base broader than top | |
| 31 | Leaves toothed, having large serrations | BEECH |
| 31 | Leaves serrated but not toothed | |
| 32 | Buds on small stalk and not scaled | ALDER |
| 32 | Buds not stalked and scaled | |
| 33 | Buds having fine fuzz | YELLOW BIRCH |
| 33 | Buds without fine fuzz | PAPER BIRCH |

# Activity: Habitat Hunt

*(The data sheet, p.* 63 *should be duplicated for student use)*

## Introduction

Habitat, the physical conditions in which an organism lives, is a concept important to understanding ecological succession because each successional stage provides a different habitat to which only certain species are adapted. "Habitat Hunt" provides a graphic way to introduce students to the concept.

## Materials

Three different kinds of small objects (nails, paper clips, beans, toothpicks, etc.).

Paper and pencil.

## Procedure

Designate an indoor or outdoor area as the "ecosystem". The area should contain several different "Habitats." For this exercise, habitat means any place that has a distinct and consistent set of conditions (exposure to light, background color, texture, height, etc.)

Distribute each kind of small object ("organism") in a different habitat. For instance, if you are working indoors all white beans might be placed on light-colored surfaces three feet above the floor and out of direct light. Outdoors, you might place all red beans under fallen oak leaves. Decide how many variables you want to use for each habitat and be careful to adhere to your scheme.

## Conducting the Hunt

Assign students to groups of three and provide each group with a data sheet. Show the students an example of each organism. Explain that their task is to determine the habitat each kind of organism is best adapted to. To do this, the students must determine all of the factors that are common to the places where the organism is found. Have them search for organisms and note on their data sheets the characteristics of the environment each time they find an organism.

You can increase the challenge in the activity by using greater numbers of organisms and by increasing the number of consistent factors in each habitat. Do not tell the hunters how many factors they should note - that is a valuable lesson to learn.

On the data sheet, the students are to record information about where they find the organisms.

## Following Through

After about 15 minutes, stop the hunt and have the students discuss their observations. Encourage them, within their groups, to speculate about the common characteristics of the places where each organism was found. This process of induction - forming hypotheses - is an important process to foster. After they've come to some conclusions, discuss each groups' hypotheses. Ask, "What are the habitat conditions that each organism requires?"

In extending the ideas, discuss the term habitat and elicit observations about the habitat features required by some familiar plants and animals. Make the connection between these artificial organisms and their habitat "needs" and the needs of pioneer and successional organisms referred to in the slide/tape program.

## Data Sheet

### Where Did You Find Each Organism

| INDIVIDUAL | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| SPECIES<br>A | | | | | | | | | | |
| B | | | | | | | | | | |
| C | | | | | | | | | | |

# Activity: Plants and the Environment

## Introduction

The plants growing in each stage of succession change their environment in ways that eventually create intolerable conditions for their offspring. The conditions, however, are well suited for the plants of the next stage of succession.

The purpose of "Plants and Environment" is to investigate and make generalizations about the soil, light, and moisture conditions necessary for plants of several distinct successional stages.

This activity leads to a discussion of habitat requirements of plants and directs attention to changes in habitat conditions occurring in successional stages.

## Materials

Data sheets and summarizing tables

Pencil or pen

## Preparing for the Activity

Select an area that has at least three identifiable successional plant communities. Identify one or more plants that are characteristic of each of the communities you have elected to examine. Some of the common plant successional sequences you might choose are:

a. pond edge to young forest

b. lawn to old field

c. old field to mature forest

d. bulldozed area to field (or garden plot to field)

Use plants that will be challenging but not frustrating to find. Succession Cards: An Ecological Game, by Eloise Clark, included in this book provide good examples of successional sequences and plant species that are found in each stage.

## Procedure

Have students find several different sites where each selected plant species grows and describe those sites' soil, light, and moisture conditions on the data sheet. Students should record the height of the plant as compared to other plants in the same community. The idea is to see if generalizations can be made based on the common features of the chosen sites.

Ask that students pay attention to plant adaptations and strategies (for dispersal of seeds, conservation of moisture, withstanding environmental conditions, etc.). Again, the Succession Cards give suggestions on plant adaptations.

## Following Through

Questions for discussion.

1. How are the plants in each community changing their environment?

2. What factors have changed from site to site?

3. Compare and contrast the different types of soils you found.

4. How is each plant adapted to the environment it inhabits?

5. What characteristics do the pioneer plants have in common?

6. What characteristics do plants of later successional stages have in common?

7. Did you find evidence of early successional plants living in later successional areas? Discuss their presence or absence.

Students should complete the summarizing table following the discussion of these questions. The purpose of the summarizing sheet is to depict a gradient of changes from one type of successional community to the next.

## Data Sheet

| Plant Name | Soil Moisture (Dry, Damp) (Wet) | Soil Texture (Clay, Sand) Loam, Silt) | Soil Depth (A Horizon) (or Topsoil) | Organic Material in Soil | Light Conditions (Open Sunlight) (Partly Shaded) (Mostly Shaded) | Height (in relation to other plants in same community) |
|---|---|---|---|---|---|---|
|  |  |  |  |  |  |  |

# Summarizing Sheet

Successional Sequence

| | | |
|---|---|---|
| Type of Area: | Type of Area: | Type of Area: |
| Plant species investigated: | Plant species investigated: | Plant species investigated: |
| Soil conditions: | Soil conditions: | Soil conditions: |
| Moisture conditions: | Moisture conditions: | Moisture conditions: |
| Light conditions: | Light conditions: | Light conditions: |
| Adaptations: | Adaptations: | Adaptations: |
| Strategies Used by The Plant: | Strategies Used by The Plant: | Strategies Used by The Plant: |

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# Activity: Taking A "Plant" Census

## Introduction

Knowing how many individuals of any particular species are present in an area is information vital to an understanding of the community and its stage in the successional sequence. "Take a 'Plant' Census" is an introduction to the quadrat census technique.

## Background

Often it is impossible to count each individual in a population. The quadrat census technique is a method for estimating the number of individuals in a population. By randomly sampling parts of a larger, defined area and counting the individuals, we can guess closely how many individuals are in the entire area.

For example, let us say that we have a one meter square study area subdivided into 100 quadrats, each one decimeter square. We randomly sample five quadrats. In each quadrat we count organisms and find we have 3, 10, 6, 1, and 5. By adding these numbers together (25) and dividing by the number of quadrats (5) we find that the average density of organisms per quadrat is 5. We know that there are 100 (10 x 10) quadrats in our one meter square study area. By multiplying the number of quadrats (100) by our estimated density of individuals (5) we can estimate that there is a population of 500 individuals in our study plot.

## Materials

A coat hanger shaped into a square or circle is about one decimeter in area. Use these for quadrats. One coat hanger per group of students is sufficient.

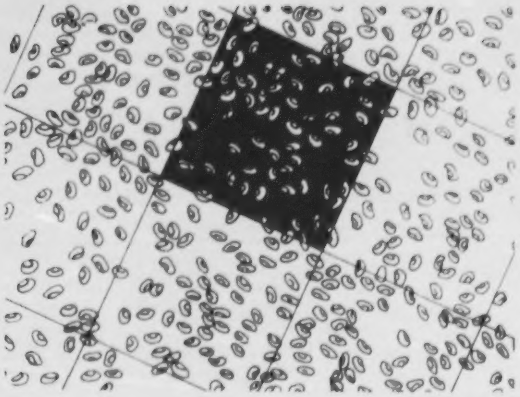
A quantity of small objects such as dried beans.

Paper and pencil.

## Preparation

For this introductory activity we are not going to count actual plants, but small objects instead. You might use beans, paper clips, toothpicks, seeds, or any other small unbreakable objects. As leader you should know how many individuals are distributed.

Next, mark out an area in which to conduct the census. You might use the school lawn, a parking area, or even the classroom floor. (A tiled classroom floor is suitable because the tiles are ready-made quadrats, although you will have to determine the total census area.) Sampling by random numbers (see next page) will work well if the census area is marked out and the quadrats create a grid.



Adapt the size of your study area to the number of students working. Determine a quadrat size that will be suitable for the size of your study area.

Distribute the population of objects fairly evenly throughout the study area. The more nearly uniform the distribution, the more successful the estimating will be.

Procedure

One way to launch the activity is to pose the question, "How can we estimate the number of individuals in this study area without having to count each one?" The class will probably devise the basic technique.

a. Each student (or small group) should take several random samples. The number will vary with the size of the area and your time. One way to make the sampling random is to toss the coat hanger loop quadrat into the air and count the number of individuals within the quadrat wherever it falls (being careful not to redistribute organisms too much in the process).

b. Average the samples by dividing the total number of individuals counted by the number of quadrats sampled.

c. Multiply the average by the total number of quadrats in the study area to arrive at the estimated population.

After students have obtained estimates of the population, discuss the final results and compare them to the known population. Discuss the average densities and the factors that might influence the outcome of this sampling technique.

Following Through

This technique can be used for censusing real plant communities, especially low-growing plants. It is important to stress that the technique is for estimating, not counting. Estimates are useful in making comparisons of different communities or stages in succession.

You may wish to set up a study area with a grid pattern of numbered quadrats. These quadrats can be sampled systematically or randomly. Another random sampling technique is to open a book to any page and sample the quadrat that corresponds to the last digit of the page number (e.g., page 322 - sample quadrat #2).

The activity, "Density of Ten Familiar Plants," is a logical next step.

# Activity: Succession Through Community Sampling

## Introduction

Succession is not something you can see happening in a day, a month, or even a year. To see succession you need to use a "before and after" technique in which you sample the plants in an area and compare the results to another area that has grown up from a stage like the one sampled. The differences make up the evidence that succession has occurred.

This activity involves students in a comparison of different successional ages by having them sample the densities of ten common plants growing within the two areas. Two successional communities may have the same species but can be quite different due to differing species densities. If two communities, similar in soil structure, drainage, slope, and exposure can be found, students will be able to see that the younger will in time develop into a community similar to the older. You might use an old field with shrubs and young trees and compare it to a young pine or mixed pine/hardwood forest.

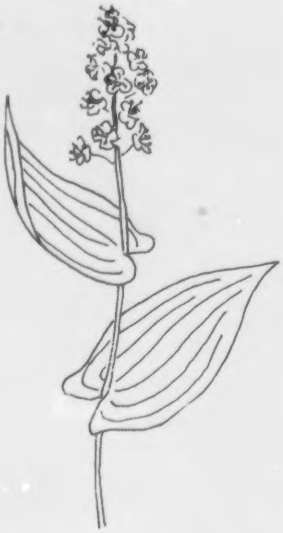
## Preparation

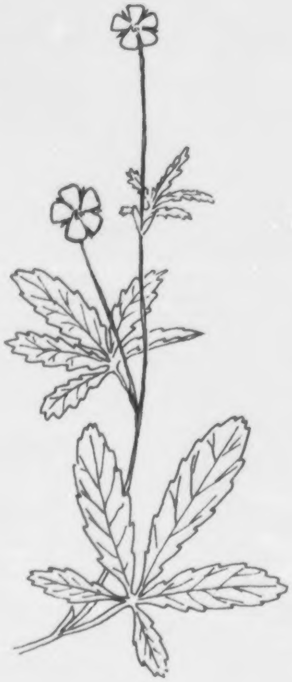
Locate two successional communities of different ages that are at least 30 meters square. It is important that these communities be homogeneous in plant structure. A field that has become more overgrown along its margin than inside would not be a good community for this activity because of its lacking homogeneity.

Choose ten plants that occur frequently in at least one of the two communities. The activity will be more successful if at least half the plant species occur in both communities to some extent.

In a field-becoming-forest situation, look for the following ten plants:

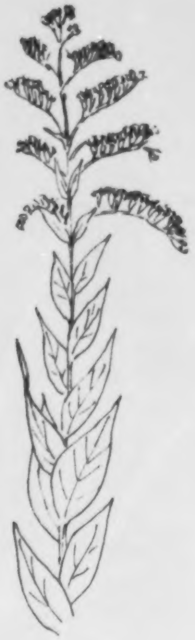
Canada Mayflower

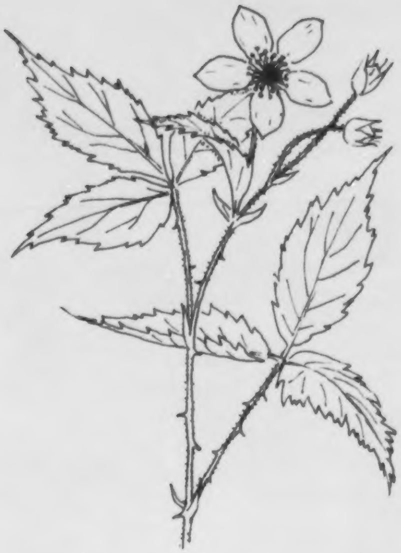




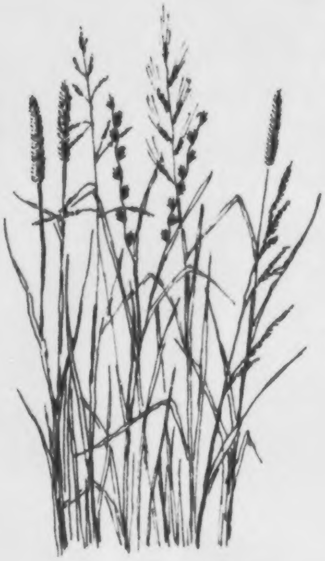
Common Cinquefoil

Goldenrod



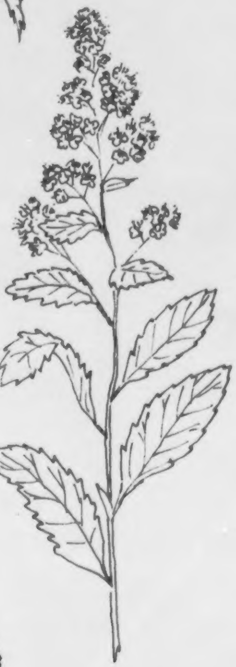


Blackberry

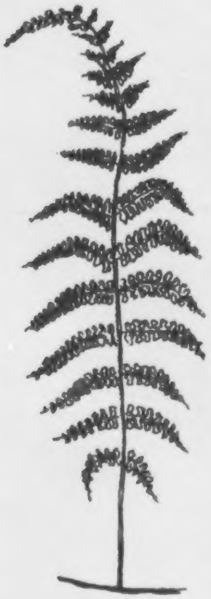


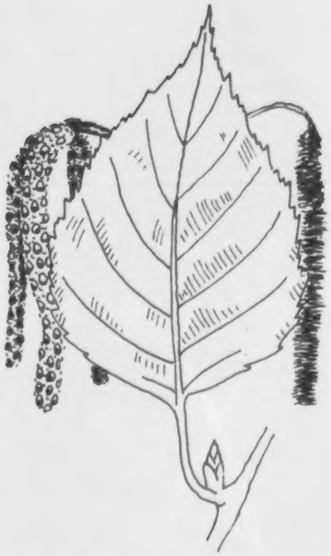
Grass

Meadowsweet

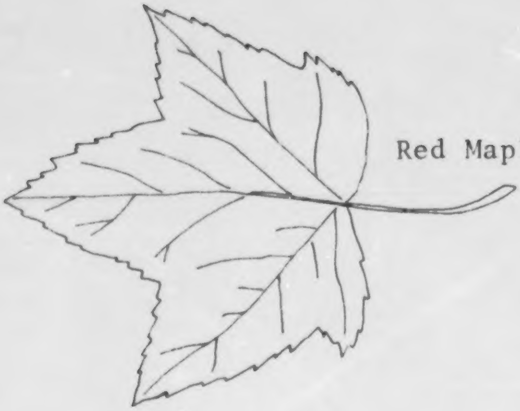


Hay Scented Fern

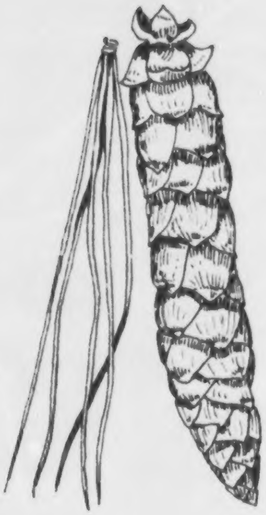




Paper Birch



Red Maple



White Pine

The drawings will aid in identifying these plants.

Materials

Wooden stakes (8)

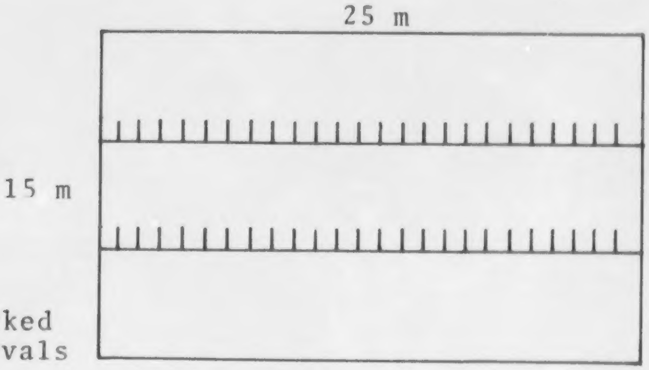
String (80 m)

Frame made of 1" x 2" stock, 1 meter on a side (2 or more)

Paper and pencil

Procedure

Within each community set up a rectangular study area with the long side running with the slope of the land. The areas in each community should be of equal size. Standard forest sampling procedure calls for a 25 meter by 15 meter area subdivided into three quadrats as follows. Using stakes and string, outline the complete area. Five meters in from the long sides, place stakes at the top and bottom of the area. Run string from these stakes to subdivide the area into 5 meter by 25 meter quadrats as shown. Mark off the center strings in meter units.



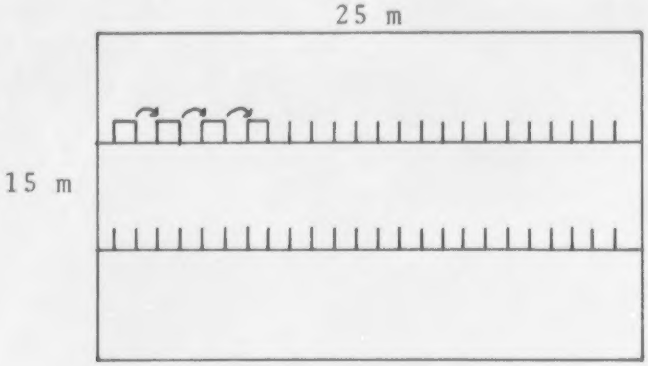
Middle strings marked at one meter intervals

## Team Assignments

Assign to small groups the task of counting the plants. One group will count all the woody plants that are knee high or taller. This group counts all the specimens of each species within the whole 15 m by 25 m area, though they may find it easier to keep track of their counting if they work within one quadrat at a time. Two or more groups may share this assignment.

Another group, or groups, will sample the herbaceous and woody plants that are less than knee height. They will use a frame that is one meter on a side. (A hoola hoop will approximate one square meter.)

The two interior graduated lines are used to direct the placement of the wooden frame for sampling. Starting one meter in from either short end of the study area, the frame is placed so that one side lies along the string and the rest of the frame extends toward the long sides of the study area. Within the meter square frame the number of plants of the ten species are counted and recorded. After counting the plants, the frame is moved two meters down the line and the plants sampled again in the same fashion. Continue in this way until 12 one-meter samples have been taken along each middle string.



## Calculations

The density of the plants over knee height can be figured by dividing the total number of individuals of a species within the area by $375m^2$.

For herbaceous plants and low woody plants, add the number of individuals of a species for all 24 frames together and divide by 24.

This will yield the density of the plants per square meter.

## Following Through

Class discussion of these questions will help students to see that succession has occurred.

1. Which plant species increased in the older community and which plants decreased in comparison to the younger community?

2. Why did these changes take place?

3. Predict which species of plants will increase their densities in the future and which will decrease.

4. If the densities of some plants were similar in both communities, how did the average size of the plants compare?

5. If the size of plants is important information, how would you measure and record the size of the plants studied?

# Activity: Beavers, Blowdowns, and Butternuts: An Investigation of Succession in Pisgah

*(The map, p 83 , should be reproduced for student use)*

This walking field trip along what is known as the Old Chesterfield Road in Pisgah State Park, is intended to help students investigate successional changes after a variety of disturbances - agriculture, beavers, human dams, and hurricanes.

Four of the five stops have suggestions for active investigations. Stop A, The Wilder Place, focuses in on the effect of beaver on the landscape. Stop B, The Big Blow, provides a comparison between succession after a hurricane and grazing. Stop C, The Whittemore Place, is a good site for teaching and using the belt transect method of vegetation analysis as a way of studying succession. Stop E, The Davis Place, is quite frankly an enigma to us. Although this is actually the third stop you will reach walking in, we suggest that you save this for a final investigation on the way out.

Stop D, Dogwood Swamp, does not lend itself as easily to investigations and, hence, our tone is more didactic. This stop is also the farthest away from your parking site so you may wish to exclude it.

The distance from the parking site to Stop D, Dogwood Swamp, is approximately one mile. The entire trip using all five stops can be done in 4-5 hours including a lunch stop. The time will vary with the age, vigor, and interest level of the students. You may wish to eliminate or alter the activities. Adapt the trip to your group's needs.

Here are some suggestions to increase the value and enjoyment of your trip.

1. Go to the area ahead of time to scout it out. This will help you (a) to make necessary modifications for your group, (b) to become more familiar with our activity suggestions and how they can be implemented, and (c) to actually find the place!

2. You may wish to call Cecil Parker, park manager, at (603) 352-0611 to advise him of your plans.

3. Bring at least one copy of the Pisgah State Park map and a compass.

4. Bring water. The availability of safe drinking water varies with the season.

5. Come prepared for insects. The fall is perhaps the most pleasant season to do this trip. If you come in the spring or summer bring insect

repellent, a hat, a bandanna, and a long-sleeved shirt. A trip in the spring is by no means impossible, but it can be exceedingly unpleasant if you are not prepared.

Three of the stops have cellar holes that can be investigated. We recommend that you read the activity entitled Cellar Holing, in section 2, Cemeteries and Cellar Holes. Beavers, Blowdowns, and Butternuts lends itself to a combined social studies and science field trip.

## STOP A - The Wilder Place

### Introduction

The first stop is down the dirt road from the Park entrance a few hundred yards. A side road on the right will lead you through an abandoned homestead. Along with cellar holes and a well (refer to cellar hole activity, Cemeteries and Cellar Holes), you might point out plants that indicate past human inhabitation. Some of these are myrtle (entrance of turn off), daffodils, lilies of the valley, large sugar maples, butternuts and apple trees (there is a small abandoned orchard about 100 yards up the turn off). Before you reach the orchard, there is a small abandoned beaver pond about 100 feet to the left of the side road. One hundred yards upstream from this pond is the main pond and lodge. This activity is designed to reinforce concepts dealing with the succession of beaver ponds.

### Activity

Divide the class into groups of three or four students. Starting with the small pond, have these investigative groups make observations about the beavers' activity in this area. They should look for these things:

Recent barking or gnawing of trees (gray gnawings are at least a year old)

Smooth trails (beaver drags) leaving the pond

Vegetation on dam or lodge (shows lack of maintenance)

Pond's margin

Water level at dam (if below the top of the dam, the dam is in disrepair).

They should also examine the kinds of trees that border the pond. Willows, alders, poplars, maples, oaks, and beech are all preferred food trees. Conifers, birches and cherries are usually avoided. If all the preferred species are absent within 100 feet of the pond's margin, it shows that the winter food supply was exhausted. Gnawings on conifers, birches and cherries are also signs of a dwindling food supply.

After making observations at the lower pond, move the class upstream to the larger pond (the thick growth makes walking difficult, so you may wish to bypass the upper pond). At the upper pond ask the groups to make the same observations. Let the groups then discuss their ideas of whether the ponds are active or abandoned and if abandoned, for how long? Also have them try to decide why the ponds were abandoned.

## Interpretation

There are obvious signs of the ponds' abandonment. These are reduced water levels, vegetation on the dams and lodge, and lack of recent gnawings. However, there is an ample food supply of preferred trees close to the pond's margin, so the beaver did not leave because of lack of food. The best guess for their absence would be over trapping. The pond was probably abandoned in 1979. Sparse colonization by herbaceous plants along the pond's margin and dam would indicate only one year's abandonment. In two years the herbaceous vegetation would be quite dense.

## Follow Up

Have the class discuss what might happen to the pond. Will the dams eventually break? How will that change things? Would plants that have invaded the margin invade the pond if it were drained? Would woody plants ever invade the drained pond? Could a forest ever grow there? What trees would do well in such a place?

Also discuss the role of beaver in New England. Are they important to our ecosystems? Why? Do they ever become a nuisance? How do you feel about trapping?

## STOP B - The Big Blow

## Materials

Compasses

## Introduction

This stop is marked by a large boulder on the right side of the road that has been split into three pieces. This area illustrates that two adjoining pieces of land can have different histories. This stop can be used to help students to develop landscape reading skills. You will notice that the forest on the downhill or left side of the road is quite different in composition from the forest on the uphill or right side of the road. Both have similar site conditions in terms of slope, aspect, and depth of soil. However, each piece of land has a distinct history which accounts for the differences.

## Activity

The task here is for students to investigate each piece of land and to develop and support a hypothesis about its history in the last 40 to 50 years. Divide the group into two teams of "land detectives" one for each side of the road. Before sending the groups out, go over signs of disturbances that will give clues to the land's history.

Fire - thickened bases; charred wood; uneven stumps; fire scars on tree bases

Wind - Uprooted trees; hummocks caused by prostrate trunks (check the direction in which the trunks lie to determine the wind direction).

Grazing - Juniper; stone fences (with large stones); abundance of white pines, poplar, or grey birch; barbed wire.

Logging - Evenly cut stumps.

Suggest that they date white pines by counting the whorls of branches. Each whorl represents one year of growth.

After ten to fifteen minutes of investigations have the teams switch to investigate the area on the other side of the road. After another ten to fifteen minutes have the students gather to discuss their hypotheses and the supporting evidence. You may feel the need to go back to the areas in order to point out additional evidence or do a clarifying investigation suggested below.

## The Downhill Side

This area was disturbed by a heavy wind storm. Note the hummocky terrain caused in part by the remains of blown down trees. Also note the direction in which most of the trunks are lying. Determine the direction from which the winds came. Close examination of the blowdowns will indicate that many were red pines. This can be determined by the bark on some of the stumps. Red pines are very susceptible to wind throw because of their shallow root systems. Determine the age of the oldest white pines in the stand.

Our hypothesis is that there was a stand of predominantly red pines growing here in the 1920's and 1930's. The famous hurricane of 1938, which caused enormous forest damage, blew most, perhaps all, the trees down. Since there are few trunks and many stumps it can be assumed that the fallen trees were logged. The area, opened again to sunlight, was reforested by white pines, the oldest of which seems to be about 35 to 40 years (in 1980). White pines need mineral soil to successfully germinate. The upturned roots and disturbed soil from logging provided a good mineral substrate for germination. This supports the hurricane theory.

## The Uphill Side

In contrast to the downhill side there are no signs of big blowdowns here. Why? The presence of juniper, barbed wire and a large stone fence indicates the land was used for grazing before it was forested. The oldest white pines are in the neighborhood of 40 years old (in 1980). This seems to indicate that this piece of land was in pasture or had just been abandoned at the time of the 1938 hurricane. Notice how the short-lived trees like poplar and grey birch are dying out. Succession is still in process here.

## Following Through

The effect of wind on landscape is a topic we have not dealt with in detail in this unit. You might have your students investigate the 1938 hurricane and its effect in New England.

What will be the composition of these two stands in 30 years? 100 years?

## STOP C - The Whittemore Place

### Introduction

The Whittemore Place is the second clearing on the left after you pass trail junction 4. The buildings here were abandoned well before the state acquired the land in 1967. A survey of the area will reveal two easily identified building foundations and a well. Also notice the large sugar maple near the road and the butternut at the back of the clearing. In case you are not familiar with the butternut, look for trees that are alternately branches, with compound leaves and wide, smoothtopped, interlacing bark ridges. The butternut, a member of the same genus as the walnut, was used by settlers to make dyes and stains. Both sugar maple and butternut are frequently found around old homes. Have your students look for other introduced plants such as apple, lilac, and myrtle.

The clearing is reverting to forest. It shows quite well that succession is not only a process over time but distance as well. If you walk from the center of the clearing to the edge of the forest you will pass through several successional stages including herbaceous, woody shrubs, and young trees.

### Activities

The area lends itself to several possible activities to delineate and examine the different stages of succession.You might walk as a group from the center of the clearing to the edge pointing out the successional stages and major species of each stage.

Use colored forester's tape to delineate the vegetation zones. This would graphically depict the plant changes.

The area is also a good place for doing a transect study. Essentially a transect study utilizes the quadrat sampling techniques described in earlier activities except that the sampling is done along a line that parallels the successional changes. At this site the line would run from an open field area through the woody tree stage to the forest itself. Students should sample at designated intervals along the line for the species found within the quadrats and the percentage of the quadrat area covered by each species. If you would like to do a transect study, it is important that you visit the site beforehand. The area is rapidly changing and you will need to adapt your study to the present conditions. A detailed description of how to do a transect study can be found in Terrestrial Ecology, edited by William Andrews and in most field biology or ecology texts.

## STOP D - Dogwood Swamp

### Introduction

After Stop C you will continue down the dirt road until you come to a small wooden bridge. To the left is the large marshy and swampy area known as Dogwood Swamp. The swamp was created by the damming of Broad Brook before the turn of the century for hydropower and the timber industry (refer to Waterwheels and Lumbermen). The swamp is named for the vast amount of silky dogwood that grows in it. This shrubby dogwood can be seen near the bridge and is identified by its opposite branching pattern and its fuzzy new growth.

To the right of the bridge is a small segment of the swamp. Swamps are ecosystems that have standing water and support growing trees. In this case the dominant tree is the red or swamp maple, named for its ability to grow in standing water. The red maple is our most common swamp tree in New England, but it also occurs in many of our forests. In respect to moisture it has a very wide range of tolerance.

Swamps are successional systems. This successional sequence starts with ponds that have poor drainage. In time sedges, rushes, cattails and shrubs like the silky dogwood, willows, alders and viburnums grow in from the pond's margin until there is no open water. At this point the pond has become a marsh, lacking the trees that identify a swamp. The marsh fills with silt and organic matter from the plants and the depth of the standing water slowly drops. The shrubs create small islands about them known as hummocks which provide germinating sites for trees, in this case red maples. In time, a swamp forms.

As organics and silt continue to fill the swamp and as the trees suck up the swamp's water in a process known as transpiration, the swamp slowly dries. In time, trees that cannot tolerate standing water invade the swamp and continue its drying process. Given enough time, a forest will replace the swamp. This same type of successional process can occur in beaver ponds that do not drain.

### Activity

A young swamp such as this one is a hard place to investigate first hand. You may wish to briefly discuss the succession of ponds to swamps noting that 80 years ago this was a pond. Then have the class guess what its successional future might be. What will happen to all of our ponds in central New England? How are new ponds formed? You may wish to point out that many of our ponds were formed by depressions carved by the glaciers.

## STOP E - The Davis Place

### Introduction

After Stop B you passed a road intersection on your left marked No. 4 and you climbed a hill from which you descended to Stop C. On your return from Stop D, Stop E is at the top of this hill and is found by a turnoff to the right.

This was an old homestead, with many cellar holes, eventually abandoned in the late 1950's. The cellar hole for the house is filled with staghorn sumac, identified by its alternate compound leaves and fuzzy, sticky new growth. There is also another cellar hole, possibly of a barn with a butternut growing out of the center of it. In the grassy meadow to the right of this cellar hole lies a very old foundation of a building, visible now (after some searching) only as a rectangular shaped mound, covered by grass, with an interior depression. In the woods between this old foundation and the road are terraces that appear to be old foundations.

The homestead shows many plants indicative of past human inhabitation such as day lilies, phlox, and lilac bushes.

## Activity

If this whole area were abandoned in the late 1950's (more than 20 years ago), why is it still open and not a young forest? Divide your class into investigative groups to see if they can make any observations to answer this question.

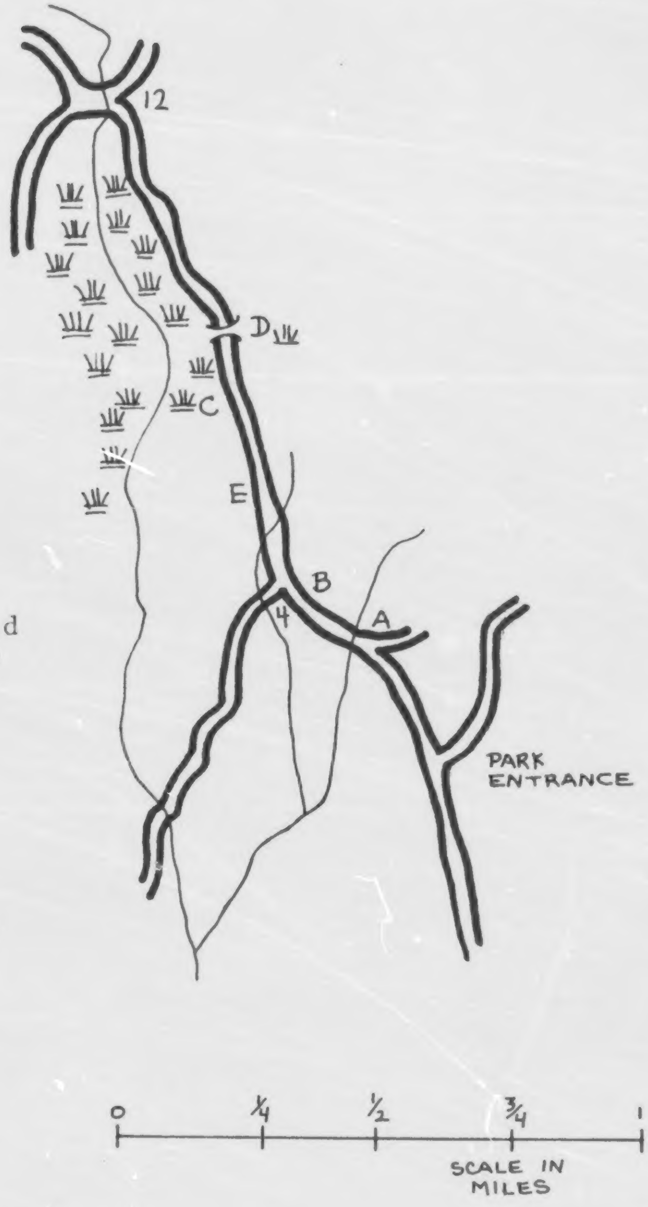
## Interpretation

It is not clear why the area is still open. It appears that it was neither grazed nor cultivated in the last twenty years. If cultivated, woody plants would have had an easy start and, if grazed, there should be some evidence of stunted shrubs and most likely some juniper. Possibly, the very thick grass turf restricted the colonization of woody plants. In any case it is a good example of succession that is not easily readable. Certainly a better knowledge of the recent history of this homestead would help; however, even with such a historical background, it might still be hard to develop a clear successional history for this area.

## Follow Up

Successional sequences are often easy to read, provided there is enough background information. Often in New England, with such a wide variety of land use practices in the last 100 years, it is hard to define just what has and is happening in an ecosystem. Point this out and let the class discuss some of the factors that could mask an area's successional history.

# Pisgah Park Succession Walk



Directions

1) Turn onto Old Chesterfield Rd. at the stop light at the center of Winchester.
2) Follow Old Chesterfield Rd. for approximately 5 miles.
3) The road forks - one fork to the right and one straight ahead. You may park here. The Pisgah Succession Walk follows the dirt road straight ahead.

Reminder:
Please be sure to call the Pisgah Park Manager to let him know when and where you will be taking a group into the park.
Telephone No.: 603-352-0611.

# Activity: Land History: A Documented Case Study

## Introduction

The history of a piece of land is created by both natural and human forces acting on it. Reconstructing the history of a piece of land leads to an understanding of its present conditon and suggests its most appropriate future uses. Research like this holds all the fascination of detective work.

This activity is the culmination of the Changing Yankee Forest Unit. Students will apply the knowledge they have gained about ecological succession to develop their observational and investigative skills. Documenting the research provides practical experience in reading the landscape.

## Procedure

Ask your students to select areas to study. Areas near home or school may be easier to study, but the choice of an area should rest more on appropriate size and interesting features. The size of the area is not critical and is limited chiefly by the type of documentation the students intend to collect. Studying plant or animal species may dictate a fairly small area. On the other hand a large area can be studied via aerial photographs.

The task is to document the history of the land for the past fifty or so years. The focus of the study should be on land history rather than on human history, but that may not in all cases be an easy or appropriate distinction. The history of a city block, for example, may tell more about people than about the land itself, but it is still land history. The principal question is, what has happened to this piece of land in the past fifty years?

Students can do this activity individually or in small groups. It might be appropriate for two or three groups to study the same area, each approaching the land's history from a different direction.

For this project the student might research:

a. Evidence of successional sequence.

b. evidence of man-caused and natural disturbances

c. major plant species

d. major animal species

e. owners or users of the land

f. the effect of the uses of this land on surrounding areas

g. possible future uses.

Students must document the project in what they consider the most appropriate form. You might suggest:

a. written and/or oral reports

b. photographs (old and contemporary, where appropriate)

c. taped interviews with people who know about the specific area

d. drawings

e. tables, graphs, charts

f. time lines

g. leaf prints of major tree species

h. an herbarium of major plants

i. maps (old and contemporary, if appropriate)

j. aerial photographs.

## Following Through

Plotting the researched areas on a map of your town or city would be the beginnings of a land use history and contemporary land use map.

# Bibliography

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Daubenmire, Rexford. Plant Communities. New York: Harper and Row Publishers, 1968.

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Hodgdon, Albion and Frederic Steele. Trees and Shrubs of Northern New England. Concord, New Hampshire: Society for Preservation of New Hampshire Forests, 1968.

Newcomb, Lawrence. Newcomb's Wildflower Guide. Boston: Little, Brown, and Company, 1977.

Odum, Eugene. Fundamentals of Ecology. Philadelphia: W. B. Saunders Company, 1971.

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Ricklefs, Robert. Ecology. Concord, Massachusetts: Cheron Press, Inc., 1973.

# Supplementary Resources for "The Changing Yankee Forest"

## Available from Antioch

The American Landscape: 1776-1976. Two Centuries of Change, by James B. Trefethen, 1976, Wildlife Management Institute, Washington, D.C. A very fine history of the American land with a number of photographs of one area over a sequence of time. A useful supplement to the activity, "Land History: A Documented Case Study."

Ecological Communities, Six sound filmstrips from Coronet Publications titled "The Deciduous Forest", "Ponds and Lakes", "The Stream", "The Meadow", "The Thicket", and "The Northern Coniferous Forest" that go in depth on each community. Useful to supplement and build upon the knowledge students gain in this unit.

A Guide to New England's Landscape, by Neil Jorgenson, 1977, Pequot Press, Chester, Connecticut. An excellent introduction to the geology and plant communities of New England. Numerous maps, photographs, and diagrams. Suggestions for places to visit. A useful bibliography. High recommended reading!

The Harvard Forest Models, by the Fisher Museum of Forestry, 1975, Harvard University Printing Office. Eight photographs of Harvard Forest Models are used in the slide show "The Changing Yankee Forest". This booklet provides more detailed descriptions of those dioramas as well as the fifteen other dioramas. These dioramas together portray a graphic history of the Central New England landscape from 1730 - 1930.

Terrestrial Ecology, edited by William A. Andrews, 1974, Prentice-Hall, Inc., Englewood Cliffs, New Jersey. A fine curriculum guide. There are several sections on succession. These include:

An Introduction to Ecological Succession.
Succession in Rotten Log: A Field Study.
Primary Succession on Rocky Surface: A Field Study.
Succession on Sand Dunes: A Field Study.
Analysis of a Terrestrial Succession: A Case Study.

Succession Cards: An Ecological Game, by Eloise Clark, 1977, Hooper Institute, Walpole, New Hampshire. A simple yet effective activity to help students read successional patterns.

# Appendix A:

## Key to Common Broad Leaf Trees of Vermont and New Hampshire

1. Leaves alternate 2
1. Leaves opposite 39

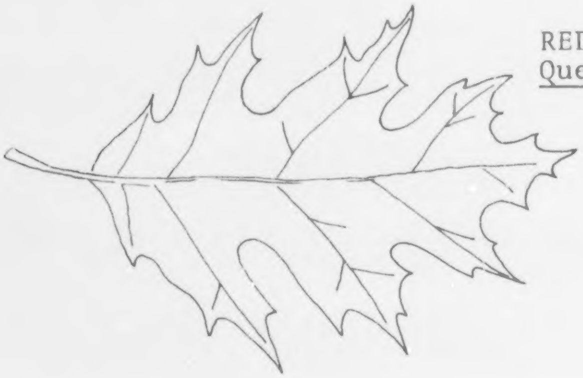
2. Leaves simple 3
2. Leaves compound 34

3. Leaves lobed or undulate 4
3. Leaves not lobed 11

4. Leaves elliptical in outline (The Oaks) 5
4. Leaves nearly circular in outline 10

5. Leaves acutely lobed, the lobes bristle-pointed (Black Oaks) 6
5. Leaves with rounded lobes or merely sinuate or scalloped on margin, no bristles (White Oaks) 8

6. Leaves dull green, their lobes cut about halfway to the midrib; bark with flat-topped ridges; acorns in shallowly shaped cups

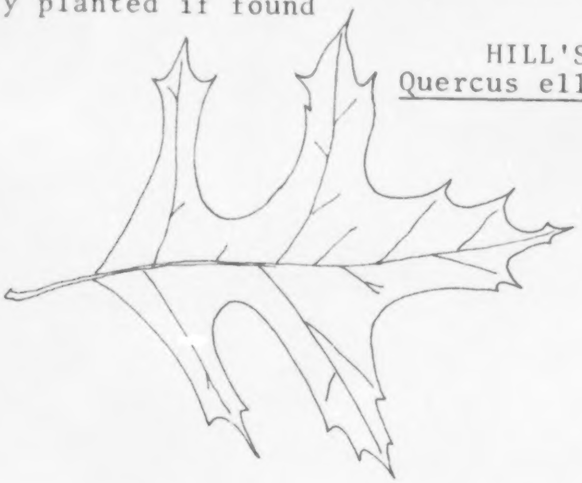


RED OAK
*Quercus borealis*

6. Leaves glossy, their lobes cut 3/4 of way to midrib or more; bark with irregular ridges, broken crosswise; acorns in deep cups 7

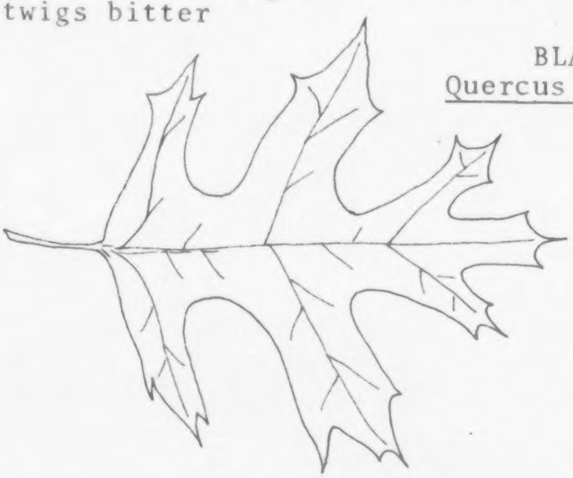
7. Leaves thin, very deeply lobed; buds nearly smooth except on margins of scales; trunk usually provided with stubs of dead branches; acorns ellipsoidal in shape; cup-scales tightly

appressed; twigs not bitter; rare in N.E., usually planted if found



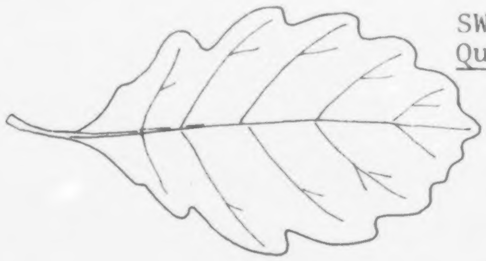
HILL'S OAK
Quercus ellipsoidalis

7. Leaves thick, less deeply lobed; buds densely hairy; trunk with no dead stubs; acorns ovoid in shape; loose fringe of scales at margin of cup; twigs bitter



BLACK OAK
Quercus velutina

8. Leaf margins shallow or coarsely-toothed, not distinctly lobed; acorns with long stalks (1-4"); lower surface of leaves densely white-hairy, in sharp contrast to dark upper surface

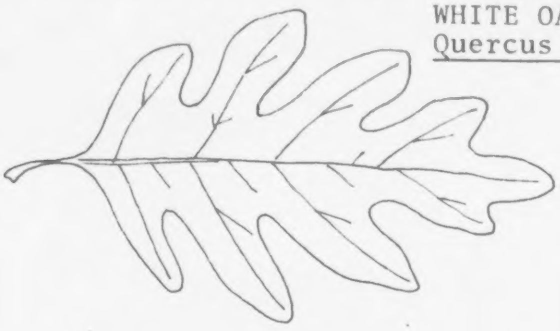


SWAMP WHITE OAK
Quercus bicolor

8. Leaf margins more or less deeply lobed 9

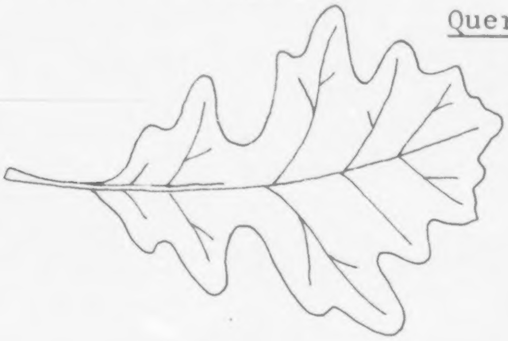
9. Leaves dull, smooth, with several deep sinuses; branches straight, smooth; bark of old trees regularly infected with a fungus which produces a nearly smooth fine-scaly surface, light gray in color, in large patches or the entire trunk; acorn cups without hairs on margin

WHITE OAK
*Quercus alba*

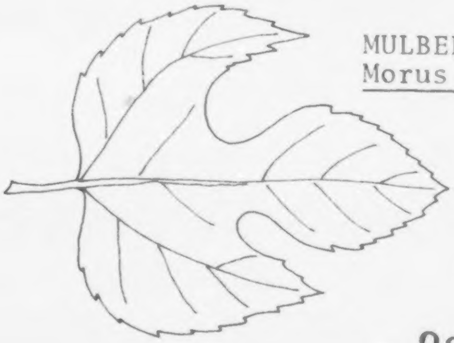


9. Leaves glossy above, hairy below, with one pair of deep sinuses; branches gnarled, often with corky wings; bark of old trees deeply fissured, rarely infected with bark fungus; acorn cups with burr-like fringe of hairs

BUR OAK
*Quercus macrocarpa*

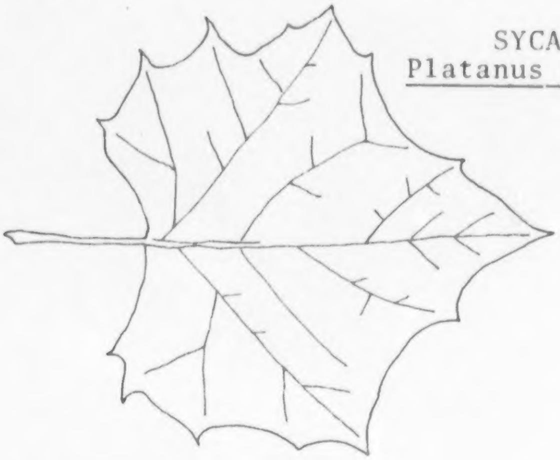


10. Sap milky, some leaves not lobed



MULBERRY
*Morus rubra*

10. Sap not milky, all leaves with lobes

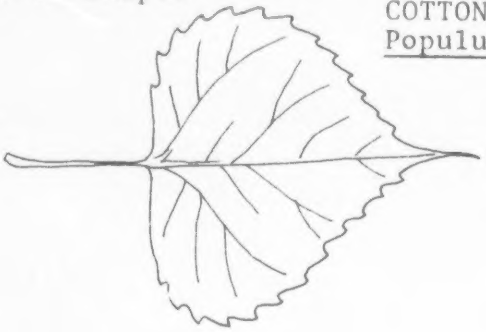


SYCAMORE
Platanus occidentalis

11. Petioles flattened near the blade (The Aspens) 12
11. Petioles not flattened 14

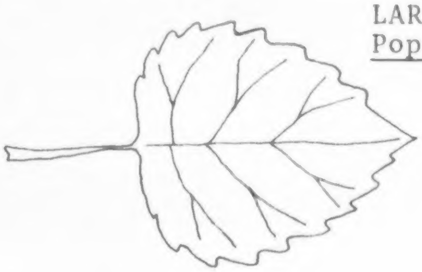
12. Leaf more or less circular in outline, with rounded base 13

12. Leaf triangular in outline, with base straight or slightly heart shaped



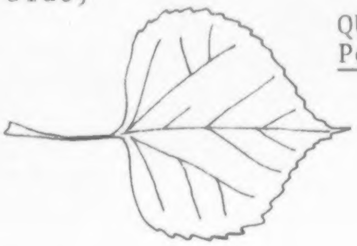
COTTONWOOD
Populus deltoides

13. Margin of leaf coarsely toothed (12 or fewer on each side)



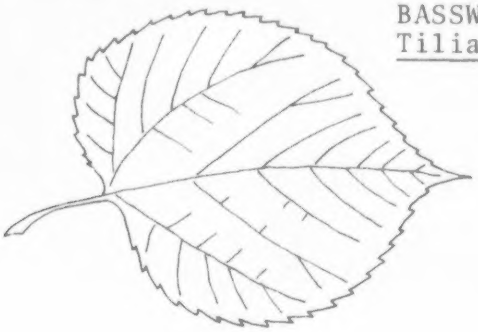
LARGE TOOTHED ASPEN
Populus grandidantata

13. Margin of leaf finely-toothed (more than 12 teeth on each side)



QUAKING ASPEN
Populus tremuloides

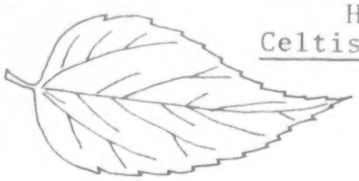
14. Leaves broad, ovate, obliquely heart-shaped; petiols more than 1-1/4" long



BASSWOOD
Tilia americana

14. Leaves much longer than broad; petioles less than 1/2" long 15

15. Leaves with 3 principle veins from base

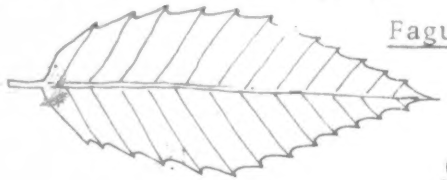


HACKBERRY
Celtis occidentalis

15. Leaves with only one principle vein 16

16. Leaves singly-toothed 17
16. Leaves doubly-toothed 23

17. Teeth coarse; bark smooth, gray



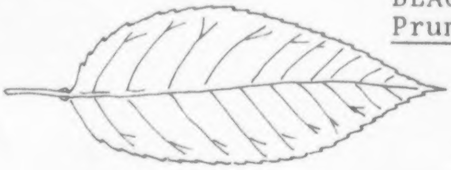
BEECH
Fagus grandiflora

17. Teeth fine; bark various 18

18. Petioles glandular (The Cherries) 19
18. Petioles non-glandular 21

19. Midrib hairy beneath; leaves oblong-lanceolate, teeth with incurved tips; fleshy, large stipules conspicous in early spring

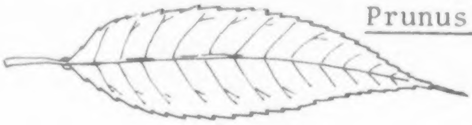
BLACK CHERRY
*Prunus serotina*



19. Midrib not hairy beneath 20

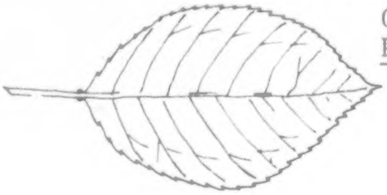
20. End buds clustered at twig tips; leaves lance-shaped or narrowly elliptical, extremely sharp pointed, very finely and sharply toothed, drooping somewhat like a peach

PIN CHERRY
*Prunus pennsylvanica*



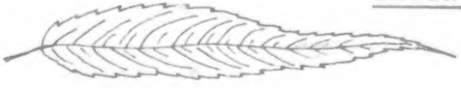
20. End buds not clustered at twig tips; leaves oval, widest above middle, sharply toothed; stipules membranous linear in outline

CHOKE CHERRY
*Prunus virginiana*



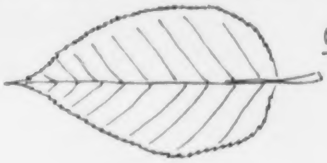
21. Leaves at least 5 times as long as broad

BLACK WILLOW
*Salix nigra*



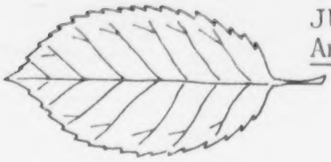
21. Leaves broader 22

22. Bark smooth, with muscular ridges



BLUE BEECH
Carpinus caroliniana

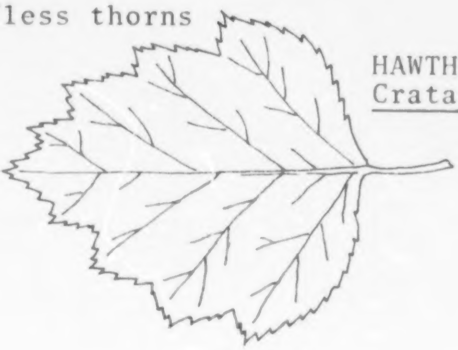
22. Bark scaly



JUNEBERRY
Amelanchier

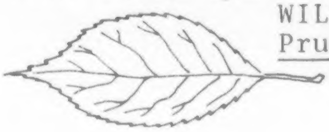
23. Branches with thorns or thornlike spurs 24
23. Branches without thorns 25

24. Branches with leafless thorns



HAWTHORN
Crataegue

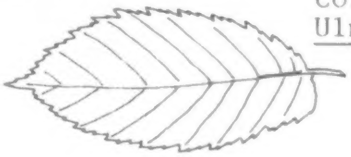
24. Branches with thorn-like leafy spurs



WILD PLUM
Prunus americana

25. Leaf bases obliquely unsymmetrical (The Elms) 26
25. Leaf bases symmetrical 28

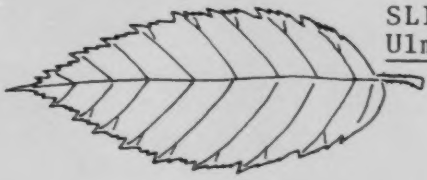
26. Twigs with prominent corky ridges; fruits hairy on surface rare in N.E.



CORK ELM
Ulmus thomasi

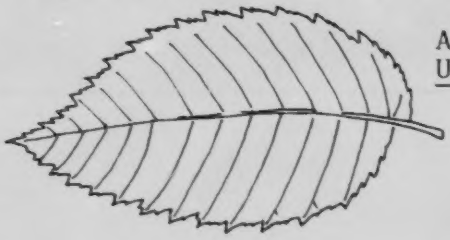
26. Twigs without prominent corky ridges; fruits smooth or with hairs on margins only 27

27. Upper leaf surface very rough (like sandpaper); twigs and buds densely pubescent; fibrous layers of old bark separated by corky arcs which are brown, darker than fibers



SLIPPERY ELM
Ulmus rubra

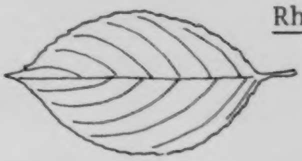
27. Upper leaf surface smooth to slightly roughened; twigs and buds sparsely pubescent; fibrous layers of old bark separated by corky arcs which are whitish, much lighter than fibers



AMERICAN ELM
Ulmus americana

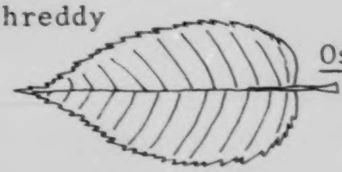
28. Main veins parallel to margin of leaf

BUCKTHORN
Rhamnus



28. Main veins not so arranged 29

29. Bark scaly or shreddy

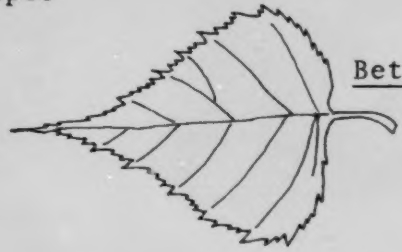


HOP-HORNBEAM
Ostrya virginiana

29. Bark papery (The Birches) 30

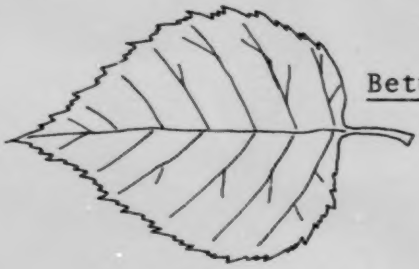
30. Trunk bark white or dirty white 31
30. Trunk bark not white, buds not resinous 32

31. Buds short, tapering both ways from middle; twigs grayish with very prominent warty lenticels, somewhat hairy; bark of older branches and trunk grayish white, usually close with few exfoliating stripes



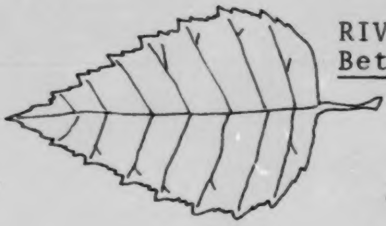
GRAY BIRCH
*Betula populifolia*

31. Buds longer, tapering from base to apex, twigs brown to nearly black, usually with less prominent lenticels; bark chalky white in mature tree, exfoliating in thin papery stripes, twigs and buds mostly glabrous, buds resinous



WHITE BIRCH
*Betula papyrifera*

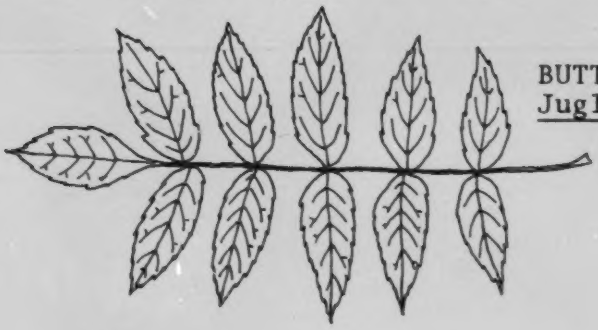
32. Twigs with wintergreen flavor 33
32. Twigs without wintergreen flavor; young bark salmon pink, becoming reddish, buds appressed to twigs, squarish in cross section, rare in N.E.



RIVER BIRCH
*Betula nigra*

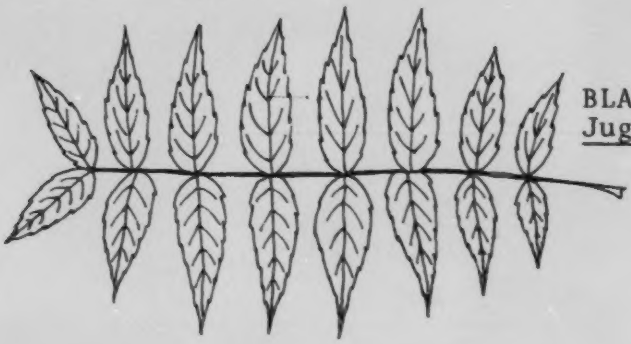
36. Pith of twigs with chambers or cavities; 13-17 leaflets 37
36. Pith of twigs solid; 5-9 leaflets 38

37. Leaflets with sticky hairs beneath, more or less straight-sided; nuts longer than broad



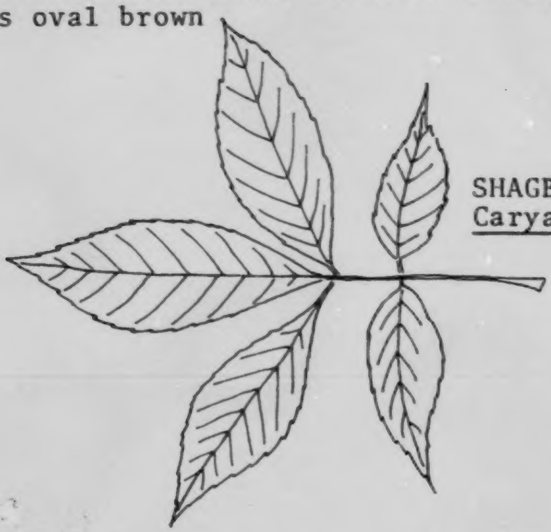
BUTTERNUT
Juglans cinerea

37. Leaflets without sticky hairs, widest near the base, nuts nearly spherical



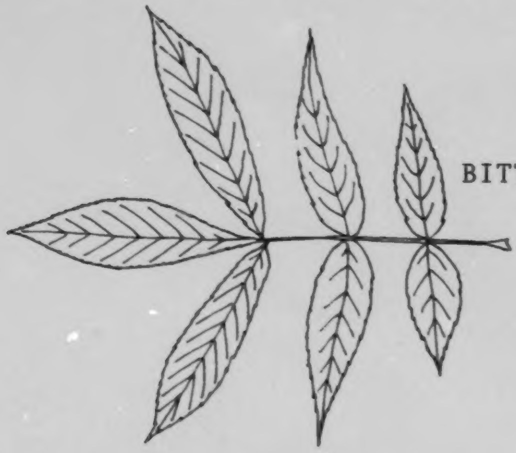
BLACK WALNUT
Juglans nigra

38. Bark shaggy; leaflets with tufts of white hairs on margins; buds oval brown



SHAGBARK HICKORY
Carya ovata

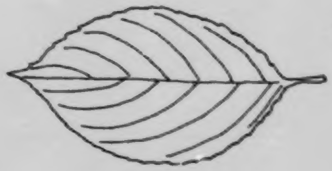
38. Bark not shaggy; leaflets without tufts of white hairs; bins long, narrow, yellow



BITTERNUT (YELLOWBUD) HICKORY
Carya cordiformis

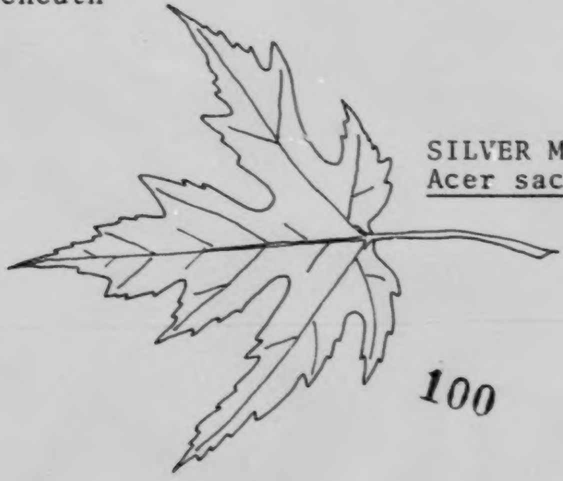
39. Leaves simple 40
39. Leaves compound 43

40. Leaves palmately lobed 41
40. Leaves not lobed; main veins parallel to margin of leaf



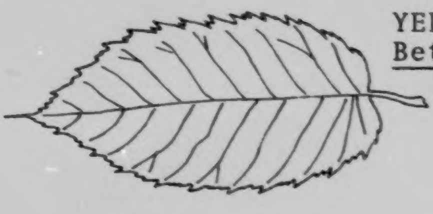
BUCKTHORN
Rhamnus

41. Middle lobe of leaf narrowed at base; leaves silvery beneath



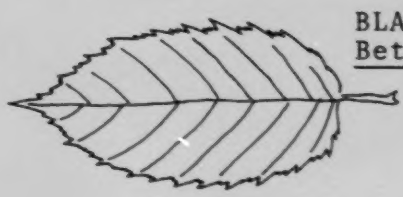
SILVER MAPLE
Acer saccharinum

33. Young bark yellowish bronze in color; buds divergent, not sharp, often hairy, nearly round in cross section, twigs difficult to separate from those of black birch (below)



YELLOW BIRCH
Betula lutea

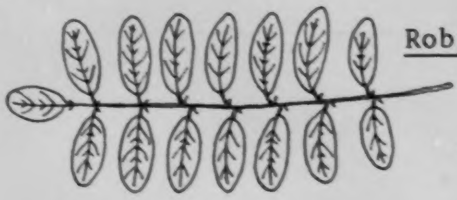
33. Bark red brown or dark gray, buds sharp to touch, very aromatic



BLACK BIRCH
Betula lenta

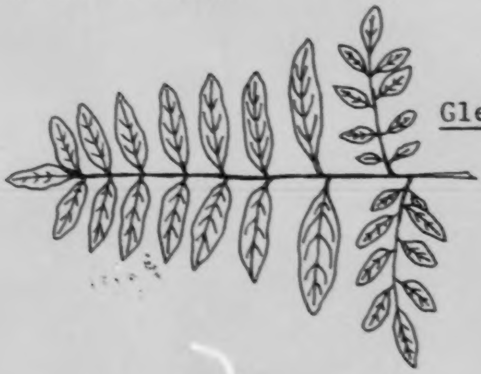
34. Twigs armed with spines or thorns (sometimes on upper branches only) 35
34. Twigs not armed 36

35. All leaves singly compound, spines small, in pairs at nodes



BLACK LOCUST
Robinia pseudo-acacia

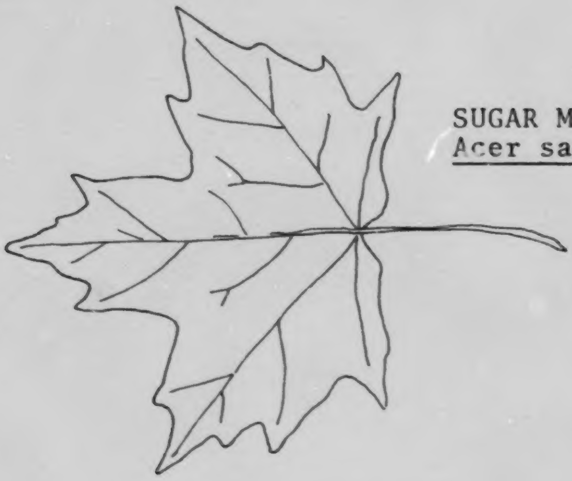
35. At least some of the leaves doubly compound, thorns stout, often branches



HONEY LOCUST
Gleditsia triacanthos

41. Middle lobe not narrowed at base 42

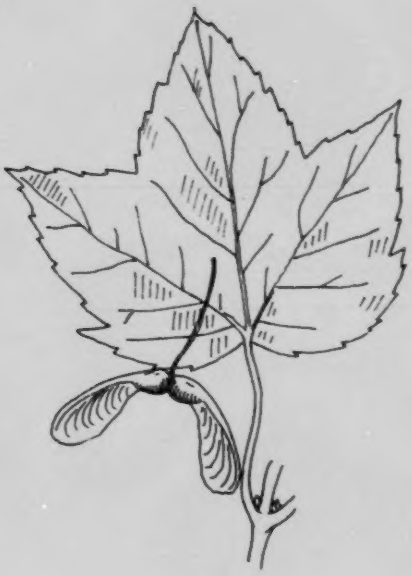
42. Main lobes with few large teeth



SUGAR MAPLE
Acer saccharum

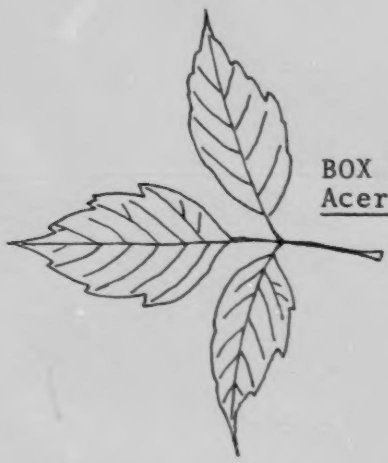
42. Main lobes with many small teeth

RED MAPLE
Acer rubrum



43. Leaflets entire or slightly toothed (the Ashes) 45

43. Leaflets lobes or doubly-toothed

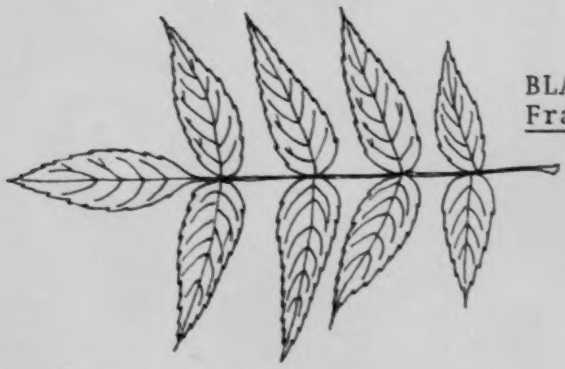


BOX ELDER
Acer negundo

44. Twigs with four corky ridges, square in cross-section, rare BLUE ASH
Fraxinum quadrangulata

44. Twigs without corky ridges, round in cross-section 45

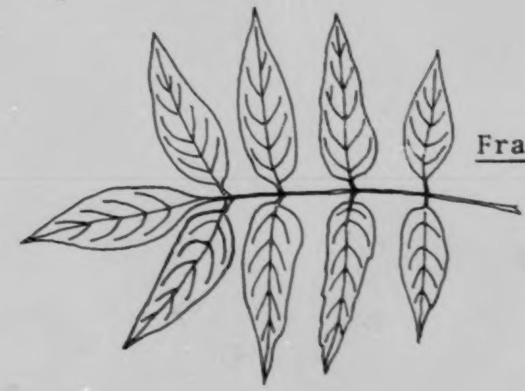
45. Leaflets sessile



BLACK ASH
Fraxinus nigra

45. Leaflets with petioles (may be very short) 47

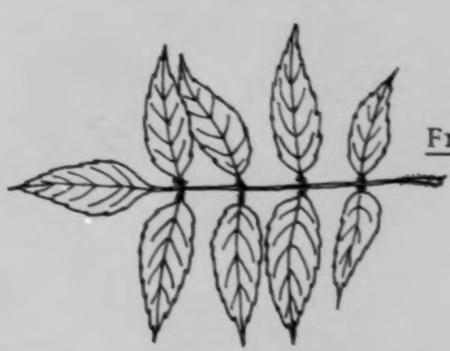
46. Leaflets pale beneath; leaf scars crescent shaped, notched at top



WHITE ASH
Fraximus americana

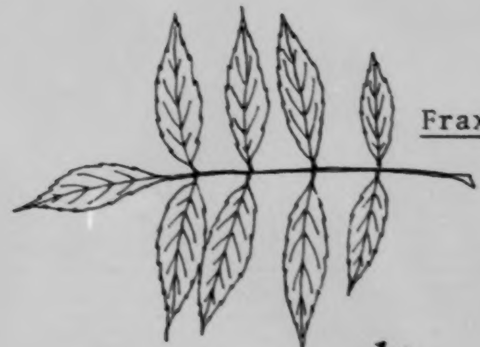
46. Leaflets green on both sides; leaf scars semicircular with straight top 47

47. Twigs and main stem of leaves hairy



RED ASH
Fraxinus pennsylmanica

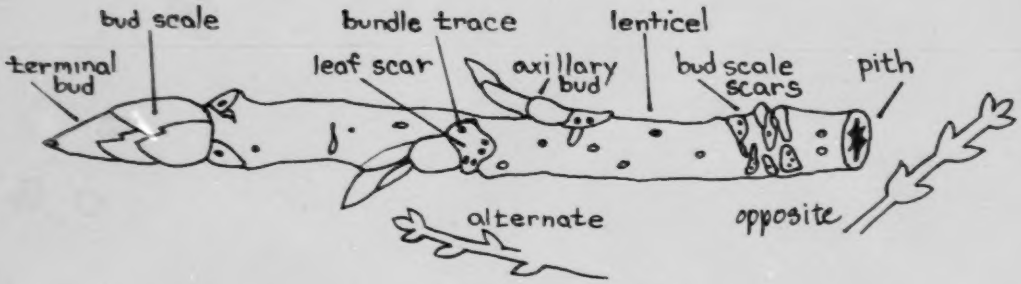
47. Twigs and main stem not hairy



GREEN ASH
Fraxinus pennsylvanica

# Appendix B:

## Twig Key to Common Trees of Vermont and New Hampshire

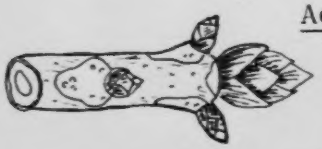

bud scale
bundle trace
lenticel
terminal bud
leaf scar
axillary bud
bud scale scars
pith
alternate
opposite

1. Twigs or branches armed with spines or thorns (sometimes absent on young locust twigs)
1. Twigs and branches unarmed 2

2. Leaf scars and branches opposite 3
2. Leaf scars and branches alternate 5

3. Twigs fine (1/8" in diameter or less), vascular bundle scars (in leaf scars) distinct and separated, usually three or four. THE MAPLES 18
3. Twigs coarse (1/4") in diameter or more) 4

4. Bundle scars confluent in a U-shaped line THE ASHES 12
4. Bundle scars 5 or more, distinct, terminal bud very large (1/2" or more) HORSE CHESTNUT Aesculus hippocastanum

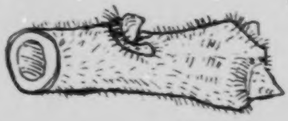


5. Bundle scars 3 or in 3 distinct groups 6
5. Bundle scars 4 to many 13

6. Twigs coarse (1/4" in diameter or more) 7
6. Twigs fine (1/8" in diameter or less) 11

7. Pith star shaped in cross section (cut with sharp blade - observe with magnification) THE ASPENS 25
7. Pith not star shaped 8

8. Twigs and buds very hairy, pith yellowish, soft and very large



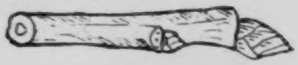
STAGHORN SUMAC
Rhus typhina

8. Twigs not as above 9

9. Pith divided into chambers in longitudinal section (cut twig lengthwise with sharp blade)
THE WALNUTS 27

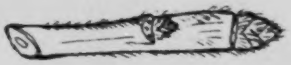
9. Pith not as above 10

10. Buds hairless



PEAR
Pyrus communis

10. Buds wooly



APPLE
Malus pumila

11. Bundle scars sunken (strong magnification needed)
THE ELMS 28

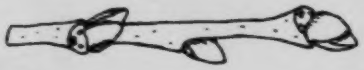
11. Bundle scars not sunken 12

12. Twigs with taste of bitter almond THE CHERRIES 30

12. Twigs without taste of bitter almond
THE BIRCHES 31

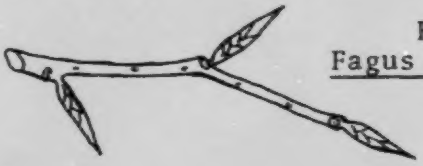
13. Terminal buds present, symmetrical in shape 14

13. True terminal bud absent, end bud obliquely unsymmetrical



BASSWOOD
Tilia americana

14. Bark of tree smooth, light gray at all ages



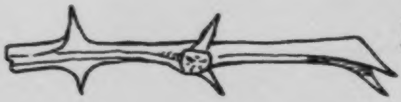
BEECH
Fagus grandifolia

14. Bark of tree rough, at least in trees over 6" DBH (DBH = Diameter at Breast Height)   15

15. Buds clustered at tips of shoots THE OAKS   35

15. Buds not clustered at tips of shoots THE HICKORIES   40

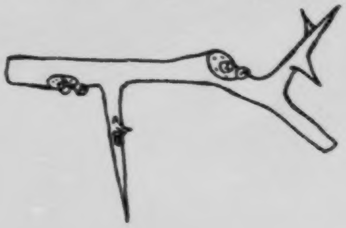
16. Spines in pairs at each node, less than 1/2" long



BLACK LOCUST
Robinia pseudo-acacia

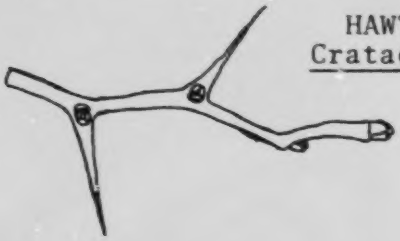
16. Thorns not in pairs, more than 1/2" long   17

17. Thorns generally branched, situated above the nodes



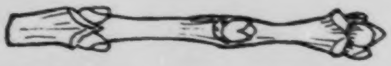
HONEY LOCUST
Gleditsia triacanthos

17. Thorns not branched, situated at the nodes



HAWTHORN
Crataegus sp.

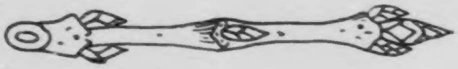
18. Buds white-wooly, twigs with a whitish bloom, opposite leaf scars joined to make a ring around the twig



BOX ELDER
Acer negundo

18. Buds not wooly, twigs without a bloom, scars not meeting   19

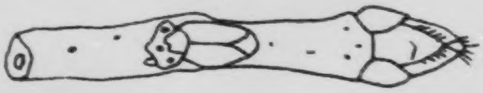
19. Buds and twigs brown, buds narrow, sharp pointed



SUGAR MAPLE
Acer saccarum

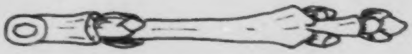
19. Buds reddish, broad, blunt pointed, twigs bright red 20

20. Twigs with strong disagreeable odor when bruised



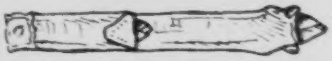
SILVER MAPLE
Acer saccarinum

20. Twigs without odor



RED MAPLE
Acer rubrum

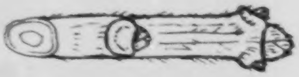
21. Twigs with corky ridges, making twigs seem four-sided in cross-section; buds gray



BLUE ASH
Fraxinus quadrangulata

21. Twigs without ridges, circular in cross section, buds brown or black 22

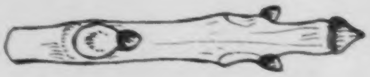
22. Buds rust-tomentose, twigs more or less downy



RED ASH
Fraxinus pennsylvanica

22. Buds not tomentose, twigs not downy 23

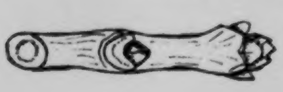
23. Terminal bud black, bud scales apiculate, bark flaky



Fraxinus nigra
BLACK ASH

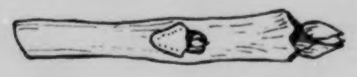
23. Terminal bud brown, bud scales rounded, bark not flaky 24

24. Upper margin of leaf scars deeply concave



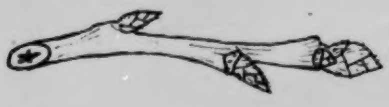
WHITE ASH
Fraxinus americana

24. Upper margin of leaf scars straight or convex (Red and Green Ash are now recognized as same species, both called Green Ash)



GREEN ASH
Fraxinus pennsylvanica

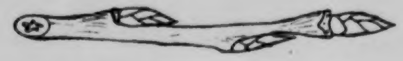
25. Buds scarcely resinous, margins of bud scales hairy, lateral buds divergent



LARGE TOOTH ASPEN
Populus grandidentata

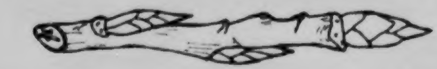
25. Buds resinous, without hairs, lateral buds appressed to twigs 26

26. Buds shiny, dark brown, 3/8" long or less, bark smooth, white, yellow or green for 10 to 20 years, small tree frequently in clumps



QUAKING ASPEN
Populus tremuloides

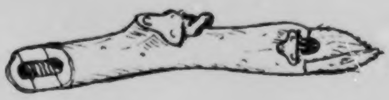
26. Buds light brown, with an excess of resin, more than 3/8" long, bark gray and deeply furrowed, may be very large tree, usually growing singly



COTTONWOOD
Populus deltoides

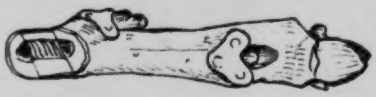
27. Pith chocolate-brown, leaf scar with downy bud above, bark with broad, flat, whitish ridges, chamber cavities in twig pith only a little wider than partitions, terminal bud longer than broad

BUTTERNUT
Juglans cinerea



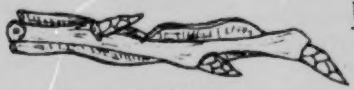
27. Pith cream or buff color, leaf scar without downy pad, bark rough, deeply furrowed with canoe-shaped depressions separated by broad, rounded ridges, chamber cavities in pith several times wider than partitions, terminal buds ovate

BLACK WALNUT
Juglans nigra



28. Twigs with Corky ridges

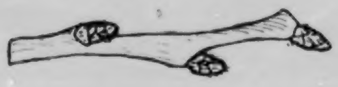
CORK ELM
Ulmus thomasi



28. Twigs without corky ridges 29

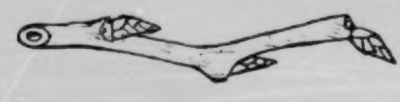
29. Twigs rough-hairy, buds rusty-tomentose, inner bark fibrous layers of old bark separated by corky arcs which are brown, darker than fibers

SLIPPERY ELM
Ulmus rubra



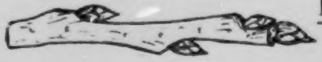
29. Twigs soft-hairy to glabrous, buds not tomentose, inner bark not mucilaginous, fibrous layers of old bark separated by corky arcs which are whitish, much lighter than fibers

AMERICAN ELM
Ulmus americana



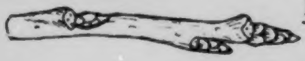
30. Buds 1/2" or less in length, bud scales uniform in color, apiculate at apex, old bark blackish, rough, scaly, young bark with transversely elongated lenticels, may be large tree up to 30 feet DBH

BLACK CHERRY
Prunus serotina



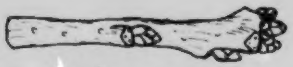
30. Buds 1/4" to 1/2" in length, bud scales grayish on margin, brown in center, rounded at apex, old bark brown, smooth, or slightly fissured, lenticels on young bark not conspicuously elongated, shrub or small tree

CHOKE CHERRY
Prunus virginiana



30. End buds clustered at twig tips, bark smooth, dark red to nearly black, and marked with conspicuous, wide, lens-shaped lenticels, tree small, dies when 4 to 6 inches DBH

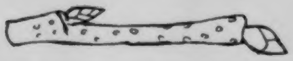
PIN CHERRY
Prunus pennsylvanica



31. Trunk bark white or dirty white 32
31. Trunk bark not white, buds not resinous 33

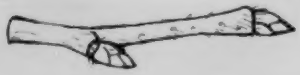
32. Buds short, tapering both ways from middle, twigs grayish with very prominent warty lenticels, somewhat hairy, bark on older branches and trunk grayish white, usually close with few exfoliating strips.

GRAY BIRCH
Betula populifolia



32. Buds longer, tapering from base to apex, twigs brown to nearly black, usually with less prominent lenticels, bark chalky white, exfoliating in thin papery strips, twigs and buds mostly glabrous, buds resinous

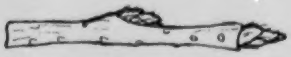
WHITE BIRCH
Betula papyrifera



33. Twigs with wintergreen flavor 34

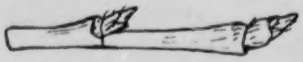
33. Twigs without wintergreen flavor, young bark salmon pink, becoming reddish, buds appressed to twigs, squarish in cross-section

RIVER BIRCH
*Betula nigra*



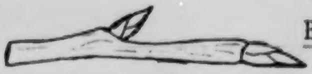
34. Young bark yellowish bronze in color, buds divergent, not sharp, often hairy, nearly round in cross section, twigs difficult to separate from black birch (below)

YELLOW BIRCH
*Betula lutea*



34. Bark red brown or dark gray, buds sharp to touch, very aromatic

BLACK BIRCH
*Betula lenta*

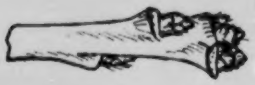


35. (Oaks are extremely variable and difficult to separate with this key. The two most common oaks in Vermont and New Hampshire are Red and White Oak)
Immature acorns absent in winter, bark of trunk gray in color, terminal buds usually about 1/8" long (may be more in Bur Oak), scar at base of acorns raised 36

35. Immature acorns present in winter, bark of trunk black, terminal buds usually about 1/4" long (may be shorter in Hills Oak), scar at base of acorns depressed 38

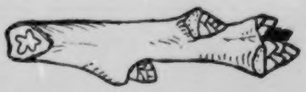
36. Twigs densely pubescent, all surfaces of buds pubescent, branches usually irregularly angled, not straight, older twigs often with corky ridges, rim of acorn cup with fringe of coarse hairs, bark thick, deeply furrowed, dark gray

BUR OAK
*Quercus maerocarpa*



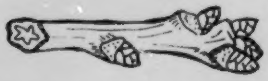
36. Twigs smooth, buds smooth or slightly pubescent on edges of scales, branches straight, older twigs without corky ridges, no fringe of hairs on acorn cups 37

37. Bark of branchlets peeling into long, dark stiff papery layers, acorns on long pedicels



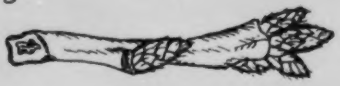
SWAMP WHITE OAK
Quercus bicolor

37. Bark of branchlets not so peeling, acorns sessile or short stalked



WHITE OAK
Quercus alba

38. Buds covered with dense wool, inner bark often orange-yellow, twigs bitter, coloring saliva yellow when chewed, tips of upper scales of acorn cups spreading



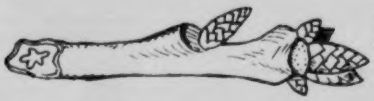
BLACK OAK
Quercus velutina

38. Buds glabrous except on margins of scales, twigs not bitter, scales of acorn cups tightly appressed 39

39. Buds often less than 3/16", bud scales ciliate on margins, inner bark pale yellow, trunks provided with stubs of dead branches near the ground, acorns small, ellipsoidal in shape

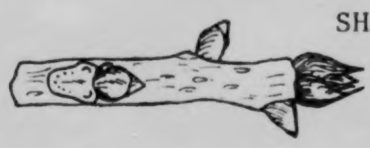
HILL'S OAK
Quercus ellipsoidalis

39. Buds 1/4" long, bud scales glabrous, inner bark white, trunk not provided with stub branches, acorns large, ovate, acorn cups shallow saucer-shaped, bark of old trees with continuous flat-topped ridges



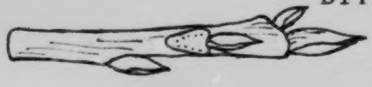
RED OAK
Quercus borealis

40. Bark shaggy, terminal bud broadly ovoid, obtuse, dark brown



SHAGBARK HICKORY
Carya ovata

40. Bark not shaggy, terminal bud narrow, long pointed, bright yellow



BITTERNUT (YELLOWBUD) HICKORY
Carya cordiformis

# Cemeteries and Cellar Holes: The Hill Farm Community

## Overview

Abandoned farms, deserted villages, overgrown cemeteries -- these ghosts of bygone eras intrigue us. It is in us to believe they can still tell us something, and we find that they do. In this unit a specific ghost town, known variously as Hardscrabble, Nash City, or southeast corner of Chesterfield, New Hampshire, will be studied. Its old graveyard, used from 1790 to 1885, will be the focus of this study of birth, life, and death of a farming community.

Why did the 18th Century settlers come to this land? What did they do to the land? What forces doomed their enterprises? These are but a few of the many questions a visit to Hardscrabble raises.

The first humans to make permanent use of much of New England's land were the farmers of English descent. They practiced a subsistence agriculture, which means there was only a narrow margin between success and failure. As the economy of America shifted to specialization and eventually to industrialization, the Yankee farm land was deserted. Today stone walls divide the forested land where once sheep grazed and flax bloomed.

Although this unit is centered on a specific spot in Pisgah State Park, teachers anywhere in northern New England can locate a graveyard, some cellar holes, and parts of old settlements nearby in which to carry out modified forms of the activities described here. The essay "Using Courthouse Records" tells how to locate useful documents. Items pertaining to Hardscrabble are contained in this book and may serve as a model, as will the activities themselves.

Both content and process are stressed in this study of a Yankee farm community. Agricultural land use is the content. Collecting evidence from cellar holes, grave stones, wills, and histories illustrate the process of historical research.

The study of land use today includes a consideration of available farm land. A community's food needs, the rising cost of transportation, and the "back to the land" movement stimulate and encourage such study. As we take up contemporary issues, we can learn much to help us from the area's first farmers who lie today in quiet spots like Latham Cemetery.

## Objectives

1. To help students develop their ability to make observations of past land use in the field and to evaluate those observations.

2. To help students to make interpretations from their observations of graveyards, cellar holes, and other evidence of former habitation.

3. To help students to find and use documents of local history.

4. To help students to recreate from field observations and studying documents the social and economic structure of a 19th century New England settlement.

5. To help students understand that the way land is used changes with economic, social and political needs and with advances in technical knowledge.

6. To help students assess their attitudes and feelings toward a former way of life in New England and in the process to clarify their own values.

## Activities

As with other units in *Yankee Lands*, this unit begins with a major pace-setting activity followed by a number of supplementary studies. All the activities are designed as much as possible with an eye to letting students experience history first hand. It is for this reason that the field trips are central to this unit.

A visit to an old cemetery is not difficult to arrange. While this unit makes reference to a specific cemetery, and background material for the study of Latham Cemetery is included in this unit, teachers who cannot get to Pisgah State Park can use the descriptions of the activities as models for the study of a cemetery nearby.

Cellar Holing can be carried out in any locality, but when it can be combined with the study of a cemetery, both of these features of old settlements are enhanced. The activity presented here is based on sites near Latham Cemetery. It is by touching the remains of such a settlement as *Hardscrabble* that students come to appreciate the reality of a way of life long gone.

Documents are included with the unit so that students can gain a clearer picture of certain individuals who lived in *Hardscrabble*. Once again, for teachers unable to visit this settlement, these documents can be obtained locally. These activities can serve as models for the construction of units based on more local people and events.

The "Death of Hardscrabble" is perhaps the activity most easily adapted to a local community. The generalizations about life in early New England can be applied to any settlement a class has been able to study. While the activity is a paper and pencil exercise, its value stems from a close acquaintance with some early settlement. The more detailed the field work and study of documents has been, the more easily can students relate specifics to generalizations.

Valuing a way of life is risky in the sense that one can be led astray by meager evidence. It is difficult to place oneself in a former time (in some respects it is impossible to do), but a discussion of the pros and cons of 19th century living can be useful to students if they learn that one carries one's own values and standards along on any visit into the past.

To assist in carrying out the activities described here or in designing similar activities, brief essays on 18th and 19th century architecture (p145), gravestone design (p135), and using public records (p150) have been included. These may serve as background for the teacher or be assigned to interested students as introductions to topics for further research.

The brief history of the region in which the settlement of Hardscrabble once thrived follows in order that all the activities in this unit will be seen in the context of New England's broad and long history.

# Essay: Historical Background

## Native Americans - Indians

The first humans to live in the area of Pisgah State Park were undoubtedly the Indians. Recent archaeological work in Swanzey dates human habitation at shortly after the Ice Age, at least 10,000 years ago. These people and their successors were nomadic travelers following the season migration of their animal food supply. Their highways were the rivers; their campsites the river banks. Firepits and "points" indicate periodic settlements. Some agriculture was practiced at summer campsites. Archaeologists feel that even the most well developed cultural group, the Pennacooks, were few in number. Pisgah, therefore, was probably used by Indians only as a source of game.

The first humans to settle permanently in Pisgah were the Europeans. Recently, archaeologists excavating an Indian village site at Fort Hill, Hinsdale, New Hampshire, found French guns and French trade items indicating contact with French settlers in the early 18th century. But it was the English settlers who came to stay. With the arrival of these European settlers the Indians, never numerous in southwestern New Hampshire, were doomed to extinction or forced to migrate.

## European Settlers

What has been called the French and Indian War is misnamed. This conflict, which continued for a hundred years, was really a struggle between France and England to see which country would control the Asian and American land areas. Whenever fighting broke out between France and England, an echoing conflict would begin in America between the French and English settlers.

The Connecticut River Valley was one of their battle lines. Each group recruited its Indian allies - the French led Algonquin Indians in raids on the English towns; the English retaliated with Iroquois warriors.

In periods of peace before the eventual defeat of the French in 1763, the English Colonial governments moved their settlers into the frontier area. Up the Connecticut River they came: Wethersfield, Connecticut, in 1632; Springfield, Massachusetts, in 1636; Deerfield, Massachusetts, in 1670; Northfield, Massachusetts, in 1713. First came the traders, then the farmers always eager for new land. Forts were built along the river to protect the outpost settlements. Fort Dummer, near Brattleboro, Vermont, was built in 1724. The next four northern forts were numbered #1, #2, #3, and #4. They would become the beginnings of the towns of Chesterfield, Westmoreland, Walpole and Charlestown, New Hampshire.

The Indians were killed or driven away, the French were driven back and confined to Canada and the English secured New England for themselves.

A remarkable thing had happened to these English settlers. As they struggled to claim the land, clear their farms, build their homes and mills, establish villages and form their governments and churches, they themselves had changed. They had been too long "on their own"; they were no longer English - they were Americans and these new Americans were eager to have their independence acknowledged.

Chesterfield

One of the towns laid out by the colonial government of Massachusetts was called Arlington, now the area of Winchester and Hinsdale, New Hampshire. It was granted in 1733. Two more towns granted that year were Upper Ashuelot and Lower Ashuelot, later to become Keene and Swanzey. Seven years later, in 1740, the boundary between Massachusetts and New Hampshire was drawn and the residents of these towns were informed that the land they were calling home was not in Massachusetts but in New Hampshire. Just at this point the war with France was renewed; most of the residents fled to their old homes in Massachusetts and Connecticut.

In 1752 settlers returned to Arlington and Upper and Lower Ashuelot and immediately petitioned the Royal Governor in Portsmouth, New Hampshire, for a charter to their towns. The governor, Benning Wentworth, was happy to oblige.

On February 1, 1752, Benning Wentworth granted a charter to a group from Fort Dummer. The governor was known as a great granter. He chartered most of the towns of western New Hampshire and of Vermont! His conditions were reasonable for the day - 800 acres for himself, a portion reserved for the Anglican Church, known as "the glebe," sometimes landgrants to his friends, and the right to name the town receiving the charter. It is likely that Chesterfield was named for the English Earl Chesterfield.

First called Number One, then Chesterfield, the area did not have permanent settlers until 1761. In that year Moses Smith, his family, his son-in-law, William Thomas, and his family, built their cabins on the Connecticut River. This settlement coincided approximately with the end of French attacks. Within six years more than three hundred were living in Chesterfield. A sawmill was in operation, a minister was "called" and roads were built to connect with Hinsdale, Winchester, Keene, and Swanzey by 1770.

Chesterfield was 15 years old when the war with England for independence began. Various records indicate that between 15 and 36 young men went off to fight the British. Sentiment for independence was not unanimous, however. Thirty-nine men of Chesterfield signed the oath of allegiance (known as the Association Test) to the new United States, but thirteen men refused to do so.

A more local conflict took place in the area while the great war continued elsewhere. The residents of western New Hampshire never felt they were a part of coastal New Hampshire or its government, whether directed by British or by Americans. The State of Vermont was emerging from the grants of Benning Wentworth to the west of the Connecticut River. As many as 34 towns considered leaving New Hampshire and joining Vermont. Many towns were sharply divided in sentiment. For some time Chesterfield had two court systems and two governments. In 1781 Chesterfield considered itself part of Vermont. Open hostilities led to bitter feelings even after the controversy was ended by pressure from General Washington. Chesterfield returned to the New Hampshire fold and the Connecticut River was established as the boundary between the two sister states.

## Hardscrabble

Neither war nor controversy slowed the growth of Chesterfield. After the Revolution many new settlers arrived (see population figures p161). The best farm land and water rights were taken so new grants were made in the eastern corners. Arthur Latham and his family may have been the first settlers to move into the southeast corner of Chesterfield, the area that became known as Hardscrabble. That is the area of Chesterfield now located in and near Pisgah State Park. Arthur Latham was born in Winchester and was only 22 years old when he died in 1790. He is buried in the cemetery that bears his name.

This southeast corner of the town of Chesterfield is an area of hills and streams. For almost a century a small community farmed the land. Today portions of Chesterfield are flourishing, but Hardscrabble is dead, its hardy residents moved away, or sleeping forever in the quiet cemeteries.

A portion of the lands these Yankees fought to tame has been set aside by the State of New Hampshire to once again become wilderness. Throughout Pisgah State Park's tangled forests and along its winding streams the handiwork of the settler/farmers can still be found.

# Activity: A Visit to Latham Cemetery*

## Introduction

The study of history is an attempt to get in touch with the past. In this activity students touch the actual remains of an 18th century community right where it lay two hundred years ago. Not only do students see where the people of Hardscrabble once lived and died, but through the use of document excerpts they experience the reconstruction of the past.

No one knew when Latham Cemetery was laid out, but the oldest stone indicates that this plot of land was set aside for the purpose of memorializing the residents of Hardscrabble before 1790. The burial ground is in good condition, reflecting a deep regard for their own past by the generations that followed after Arthur Latham.

Hardscrabble lies at the eastern edge of Pisgah State Park - more of it outside the park than inside. The cellar holes and roads, in addition to the cemetery, reveal that this was a thriving community in the township of Chesterfield at the time of the Civil War.

*(Certain pages listed under Materials will need to be duplicated for class use)*

## Materials

Make copies of these items for each student:

- Residents of Latham Cemetery, p 123
- Map of Chesterfield, 1858, p 125
- Guide Questions on Latham Cemetery, p 131
- Latham Cemetery Chart, p 134
- Latham Cemetery map, p 124
- Selections from Chesterfield Town History, pp 127

## Preparation

The map shows how to find your way to Latham Cemetery. As with any field trip, it would be best for the leader to visit the site prior to conducting the field trip.

The map shows how far you can travel by school bus. Beyond the end of the bus ride it is a 25 minute walk along a rough, but clear road to the cemetery. Cecil Parker, park manager, would like to know of your plans to visit the park. Call his home in the evening (603) 352-0611.

Before taking a class to Latham Cemetery, assign a name from the list to each student. These are the names of Hardscrabble people buried in Latham Cemetery. Using the map of the Hardscrabble section of Cheshire County in 1859, ask students to find their own namesake or their family name on the map. If it is not there, what might be the reasons? Ask students to consider where the citizens of Hardscrabble (also called Nash City) might locate their cemetery. Assign the reading, "Gravestone Design."

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* *This activity and the one following called "Cellar Holing" (p 138) can be done on the same field trip. They complement each other in the exercise of reconstructing the past.*

## Procedure

At the cemetery, students locate the stone bearing their assumed identity. (If you wish to take the time, you might consider having students do grave rubbings. This will certainly cause students to observe the stones closely. Photographing or drawing the stones will accomplish much the same thing.) Hand out copies of the questions and discuss these while students stand by their graves.

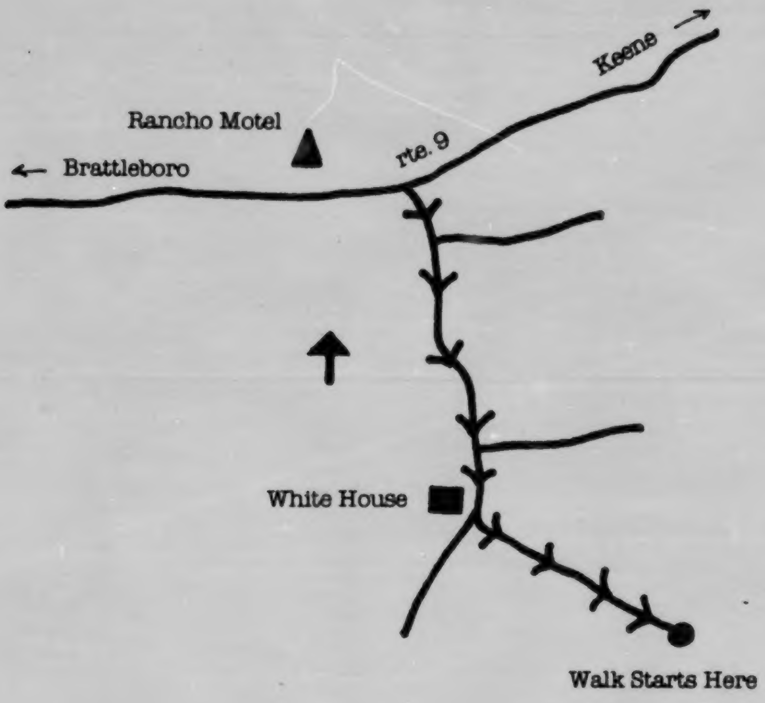
Finally, ask students to determine their family relationships. Filling in as much as they can of the Latham Cemetery Chart will both raise and answer questions about these Yankee farmers.

## Following Through

Using the cemetery map and extracts from History of Chesterfield, New Hampshire, complete the Latham Cemetery Chart.

Assign the writing of a biographical sketch of a citizen of Hardscrabble.

# Latham Cemetery Walk


Keene
Rancho Motel
Brattleboro
rte. 9
White House
Walk Starts Here

Directions

1. Turn south onto Old Swanzey Road from Route 9.

2. At the first intersection continue straight ahead.

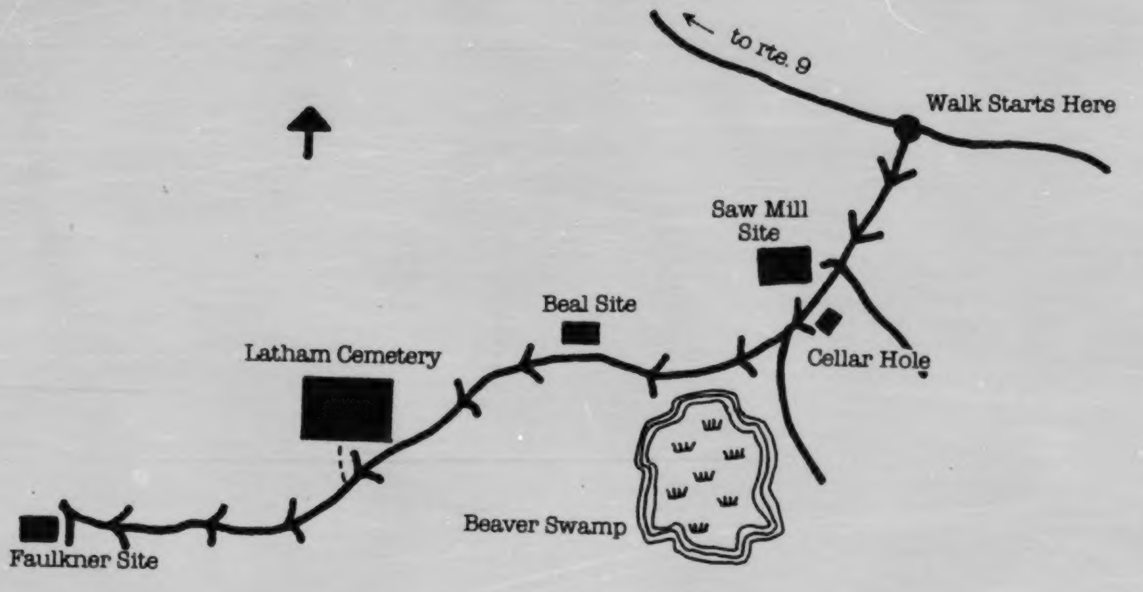
3. At the next intersection continue straight ahead.

4. Soon after you will see a white house on the right; bear left.

5. The next major roadway on the right is the beginning of the Latham Cemetery walk. Buses may be parked in one of the turn arounds along the road.

Reminder: Please be sure to contact the Pisgah Park Manager (603) 352-0611 to let him know when and where you will be going.

# Latham Cemetery Walk


to rte. 9
Walk Starts Here
Saw Mill Site
Beal Site
Cellar Hole
Latham Cemetery
Beaver Swamp
Faulkner Site

1) The walk begins with a gentle climb to an open area where the old road splits. To the right is the site of a saw mill.
2) The walk continues straight ahead. There is a cellar hole and old well to your left along the way.
3) The road splits again at an old beaver swamp. Continue straight ahead.
4) The road climbs steeply for nearly half a mile. At the top of the hill on the right is the homesite of J. Beal. This also is approximately the boundary of the State Park.
5) From here the road descends steeply for about one quarter mile to Latham Cemetery on the right.
6) About one quarter mile further on, the B. B. Faulkner site is on your left.

# Residents of Latham Cemetery*

Nancy Austin
Diana Beal
Harriet S. Beal
John Beal
John Beals
Lydia H. Beal
Mary Beal
Sally Beal
Susan M. Beal
A. C. Brown
A. C. Brown
Amos Crouch
Clark Crouch
Lydia Crouch
Sally Crouch
Benjamin B. Faulkner
Elizabeth Faulkner
Arthur Latham
James Latham
Abraham Nash
Betsey Nash
Lewis Nash
Martin Nash
? Nov. 9, 18____Aet. 84

Amos Crouch

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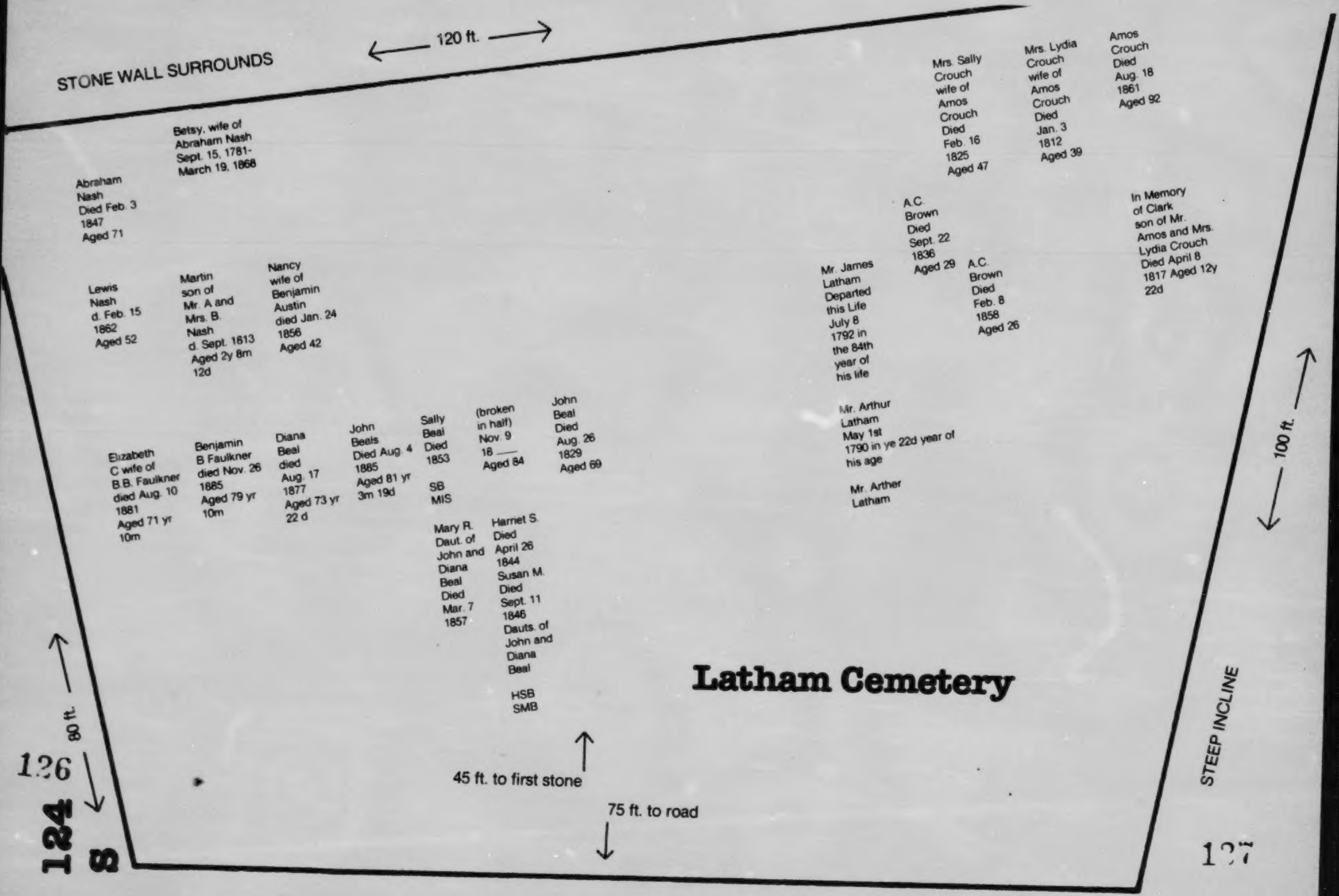
** Called Latham Cemetery in Chesterfield History p. 181. Also called Nash Cemetery.*

# Latham Cemetery



Betsy, wife of
Abraham Nash
Sept. 15, 1781-
March 19, 1868

Abraham
Nash
Died Feb. 3
1847
Aged 71

Mrs. Sally
Crouch
wife of
Amos
Crouch
Died
Feb. 16
1825
Aged 47

Mrs. Lydia
Crouch
wife of
Amos
Crouch
Died
Jan. 3
1812
Aged 39

Amos
Crouch
Died
Aug. 18
1861
Aged 92

A.C.
Brown
Died
Sept. 22
1836
Aged 29

In Memory
of Clark
son of Mr.
Amos and Mrs.
Lydia Crouch
Died April 8
1817 Aged 12y
22d

Lewis
Nash
d. Feb. 15
1862
Aged 52

Martin
son of
Mr. A and
Mrs. B.
Nash
d. Sept. 1813
Aged 2y 8m
12d

Nancy
wife of
Benjamin
Austin
died Jan. 24
1856
Aged 42

Mr. James
Latham
Departed
this Life
July 8
1792 in
the 84th
year of
his life

A.C.
Brown
Died
Feb. 8
1858
Aged 26

Mr. Arthur
Latham
May 1st
1790 in ye 22d year of
his age

Mr. Arther
Latham

Elizabeth
C wife of
B.B. Faulkner
died Aug. 10
1881
Aged 71 yr
10m

Benjamin
B Faulkner
died Nov. 26
1885
Aged 79 yr
10m

Diana
Beal
died
Aug. 17
1877
Aged 73 yr
22 d

John
Beals
Died Aug. 4
1885
Aged 81 yr
3m 19d

Sally
Beal
Died
1853

SB
MIS

(broken
in half)
Nov. 9
18 ___
Aged 84

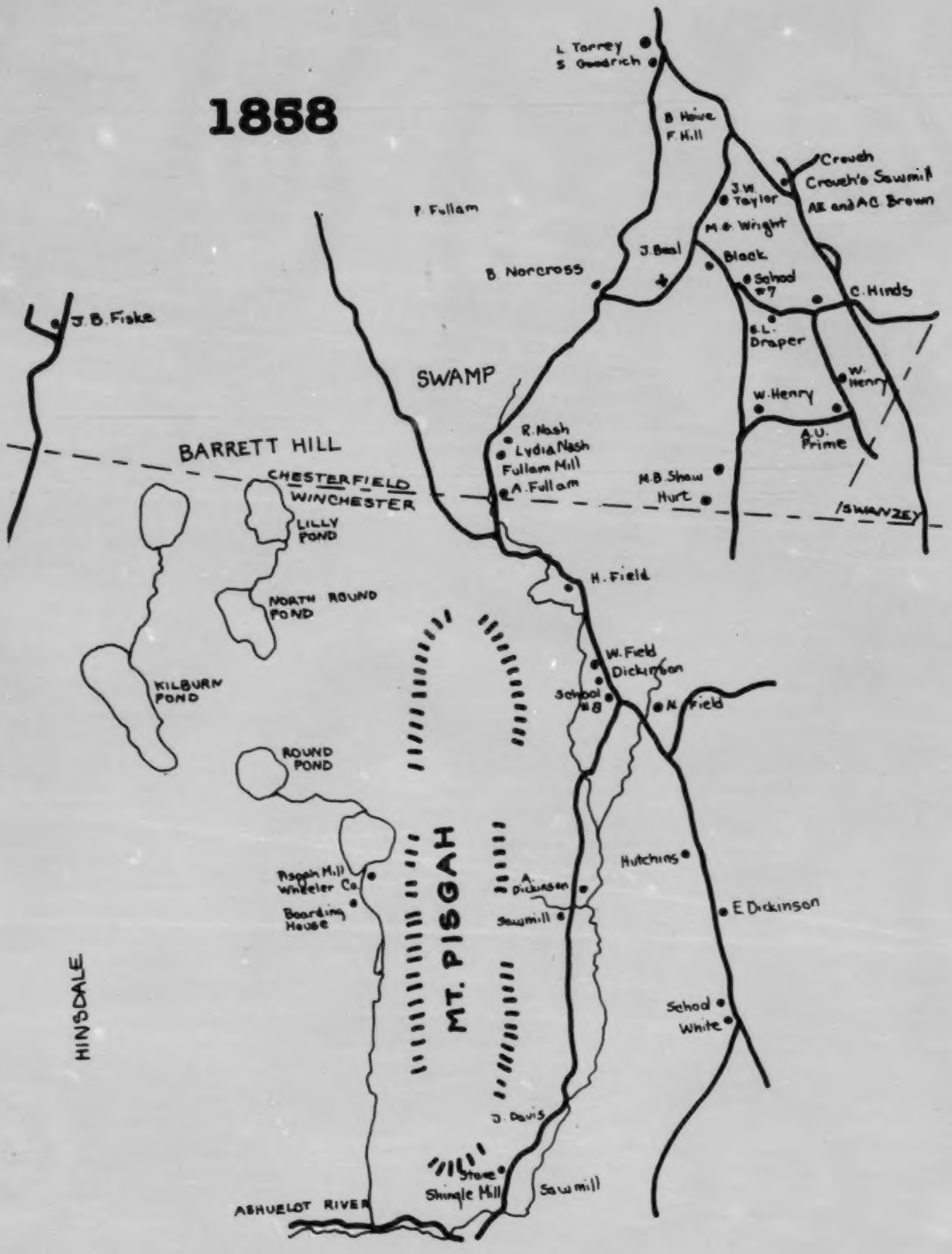
John
Beal
Died
Aug. 26
1829
Aged 69

Mary R.
Daut. of
John and
Diana
Beal
Died
Mar. 7
1857

Harriet S.
Died
April 26
1844
Susan M.
Died
Sept. 11
1846
Dauts. of
John and
Diana
Beal

HSB
SMB

# 1858


L. Torrey
S. Goodrich
B. Howe
F. Hill
Crouch
Crouch's Sawmill
AE and AC Brown
J.W. Taylor
M.O. Wright
F. Fullam
J. Beal
Black
B. Norcross
School #7
C. Hinds
J.B. Fiske
E.L. Draper
SWAMP
W. Henry
W. Henry
R. Nash
Lydia Nash
Fullam Mill
A. Fullam
A.U. Prime
BARRETT HILL
M.B. Shaw
Hurt
CHESTERFIELD
WINCHESTER
SWANZEY
LILLY POND
H. Field
NORTH ROUND POND
W. Field
Dickinson
KILBURN POND
School #8
N. Field
ROUND POND
MT. PISGAH
Hutchins
Pisgah Mill
Wheeler Co.
A. Dickinson
Boarding House
Sawmill
E Dickinson
HINSDALE
School
White
J. Davis
Store
Shingle Mill
Sawmill
ASHUELOT RIVER

# From Chesterfield History

## BEAL.

1. **John Beal**, b. June 18, 1763, came from Royalston, Mass., about 1791, and settled in the south-eastern quarter of the town. He m., May 10, 1789, Lydia, dau. of Edward Holman, of Royalston, and who was b. Oct. 29, 1763, and d. Nov. 9, 1847. He d. Aug. 26, 1829.

   Ch.: *Samuel* (2), b. June 21, 1792.—*Sally*, unm; d. May 1, 1853, a. 59.—*Polly*, d. young.—*John* (3), b. Apr. 16, 1804.

2. **Samuel**, son of John (1), m., Dec. 12, 1815, Amy Gates, d. May 23, 1854, a. 59. Resided in Chfd. He d. Dec. 5, 1870.

   Ch.: *Loring J.*, b. June 29, 1816; d. July 1, same year.—*Polly*, b. Mar. 14, 1818; d. July 20, 1819.—*Luther*, b. Nov. 4, 1819; m. Alfreda, dau. of John Martin, of Richmond; d. 1864 (?)—*Harvey H.*, b. Oct. 11, 1821; m. Julia, dau. of Jona. Hill, of Swzy; d. Feb. 28, 1876.—*Jerome*, b. Oct. 28, 1823; m. Elizabeth, dau. of Willard Burt, of Wmd.; accidentally killed on the Naugatuck railroad, Jan. 25, 1853.—*Thomas*, b. Aug. 29, 1825; d. Mar. 24, 1827.—*Thomas*, b. May 27, 1827; m. Harriet, dau. of Hiram Watkins, of Walpole.—*Andrew J.*, b. Aug. 6, 1829; d. July 23, 1831.—*Lucy J.*, b. Oct. 3, 1832; m., Aug. 17, 1852, Hector A. Smith, of Westport, N. Y., now of Chfd.

3. **John**, son of John (1), m., Jan. 23, 1833, Diana, dau. of William Faulkner (1), and who d. Aug. 17, 1877. Res. in Chfd.

   Ch.: *Geo. W. Faulkner* (half-brother of the following), b. Apr. 15, 1828; m. Lizzie, dau. of Calvin Field, of Swzy.—*John Allen*, b. May 16, 1833; m., Dec. 28, 1856, Marietta Allen. Farmer in Chfd. Has 2 ch.: Curtis A., b. Nov. 23, 1858; J. Etta, b. Mar. 16, 1868.—*Lydia E.*, b. July 13, 1835; m. John Redfearn, of Fall River, Mass.; d. in 1880.—*Sarah J.*, b. June 3, 1838; m., Oct. 6, 1857, Francis Tuttle, of Wincr., now of Chfd.—*Mary R.*, b. Mar. 31, 1841; d. Mar. 7, 1857.—*Harriet S.*, b. Apr. 8, 1844; d. 26th of same month.—*Harriet A.*, b. July 10, 1846; m., Mar. 16, 1868, Webster D. Derby, of Swzy.—*Susan M.* (twin sister of Harriet A.), d. Sept. 11, 1846.

## BROWN.

1. **Aaron C. Brown**, son of Eben Brown, of Brookline, Mass. (?), settled in Chfd. probably about 1830. He m. Lucy, dau. of Amos Crouch (3), and who d. in 1867. He d. Sept. 22, 1836, a. 29.

   Ch.: *Lydia S.*, b. Sept. 15, 1830; m. Elisha T. Taylor.—*Albert C.*, b. Oct. 21, 1831; d. Feb. 8, 1858.—*Amos Eben* (2), b. Nov. 22, 1833.—*Eliza*, b. Apr. 16, 1835; m. 1st, Nov. 29, 1864, John McClenning (q. v.); 2d, Mar. 12, 1879, Squire Amidon (5).

2. Amos E., son of Aaron C. (1), m., Sept. 21, 1858, Elmira D., dau. of Caleb Hill, of Winch., and who was b. Apr. 23, 1835. Farmer. Res. in Chfd.

Ch.: *Emogene E.*, b. Nov. 3, 1859; m., Feb. 19, 1879, Chester M., son of John McClenning (q. v.)—*Susan M.*, b. May 13, 1861; m., Nov. 24, 1880, Edson I. Leach; d. in Chfd., May 5, 1881.—*Charles G.*, b. Jan. 27, 1864; d. Oct. 6, 1865.—*Jennie E.*, b. Apr. 9, 1870; d. Feb. 7, 1875.

## CROUCH.

1. John Crouch, b. about 1729, came to Chfd., from Boxboro', Mass., in 1802 or '03, and settled in the south-east quarter of the town. He m. 1st, Hannah Brown, d. in Mass.; 2d, Betsey Robbins, who came to Chfd. with him, and d. about 1814. He also d. about 1814. Five ch. came to Chfd., viz: *Hannah*, d. 1847, a. 94; unm.—*Mercy*, d. 1814, a. about 60; unm.—*Sarah*, b. 1762; m. Samuel Draper (1); d. Dec. 19, 1863, a. 101 yrs. 5 mos. 16 days!—*John* (2).—*Amos* (3), b. 1769.

2. John, son of John (1), settled in Chfd. soon after his father did. After remaining here a number of years, he rem. to New York State; but finally returned to N. H., in the northern part of which he died. His wife was Lucy Willard, sister of Jesse Willard, of Dum. She was burned to death in Chfd.

Ch.: (The last three b. in Chfd.) *Isaiah*, m Annie Witt; finally settled in N. Y. State.—*Cyrus*, m. 1st, Aseneth Bridgman; 2d, Huldah Aldrich, of Swzy.; d. in Chfd.—*Lucy*, m. Anson Alexander, and rem. to Littleton.—*Joel*, d. in Mass.—*Willard*, rem. to Maryland, N. Y.—*John*, d. in Lisbon.—*Betsey*, rem. to Maryland, N. Y.—*Mercy*, rem. to N. Y. State.

3. Amos, son of John (1), settled in Chfd. in 1802 or '03. He m. 1st, in Mass., Lydia Brown, a native of Brookline (N. H.), d. Jan. 3, 1812, in her 39th year; 2d, Sally Brown, sister of his first wife, d. Feb. 16, 1825, a. 47; 3d, Abigail, dau. of Daniel Holbrook (1), d. 1860, a. 75. In his youth he had no opportunity to attend school; nevertheless, he learned to read, and to write his name. In his early manhood he had to contend with poverty and adversity, but by hard labor and extreme prudence succeeded in gaining some property. He was noted for his promptness in paying his debts, and with him "the 'first' of the month was always the first day." A strict observer of the Sabbath himself, he brought up his children to attend church, and would not allow them to play or visit on that day. He d. Aug. 18, 1861, a. nearly 92.

Ch.: (All by first marriage) *John* (4), b. 1796.—*Lydia*, m. Elisha Taylor, of Ashby, Mass.—*Amos* (5), b. May 25, 1800.—*Lucy*, b. 1802; m. Aaron C. Brown (1); d. 1867.—*Clark*, b. 1804 or '05; d. Apr. 8, 1817.—*Hannah*, b. May 8, 1807; unm.—*Ephraim* (6), b. Jan. 28, 1811.

4. **John**, son of Amos (3), m., 1817, Sarah, dau. of Samuel Draper (1), and who d. 1869. He res. at present in Swzy. having rem. from Chfd. about 1860.

Ch.: (All b. in Chfd.) *Mary Ann*, b. 1817; d. 1822.—*Abram L.*, b. 1818; m. Rebecca D. Taylor, of Ashby, Mass. Rem. to Iowa in 1855, and thence to Kan., where he d. Four ch. survived him, viz: Lewis E., John E., Willie H., and Ida. —*Clark B.*, b. 1818, (twin brother of Abram L.); m. ——. Has no ch.—*Levi*, b. 1823; m. Sarah Bailey. Res. in Swzy. Has no ch.—*Mary Ann*, b. 1827; unm. Res. in Swzy.

5. **Amos**, son of Amos (3), m., Sept. 25, 1822, Lucy Brown, b. in Brookline, July 24, 1799, and d. in Swzy., Apr. 14, 1873. He d. in Swzy., July 5, 1877.

Ch.: *Amos Clark*, b. in Chfd., Oct. 7, 1827; m. 1st, Nov. 4, 1857, Huldah A., dau. of Asa Phillips, of Peru, Vt., and who d. Dec. 22, 1877; 2d, Martha A., dau. of Amherst Lewis (2). Res. in Swzy. Has one ch., Nellie, b. July 12, 1864.

6. **Ephraim**, son of Amos (3), m., Feb. 15, 1832, Eunice, dau. of Samuel Draper (1). Res. in Swzy., having rem. from Chfd. in 1871 or '72.

Ch.: (All b. in Chfd.) *Eunice Semira*, b. June 4, 1833.—*Ephm. Augustus*, b. Oct. 18, 1835; unm. Res. in Swzy.—*John Luman*, b. Apr. 6, 1839; m., Sept. 7, 1865, Elmina Tarbox, of Nelson. Res. in Swzy. Has 3 ch.: Elsie E., b. Oct. 11, 1867; George L., b. June 7, 1870; Charles A., b. Jan. 18, 1873.

## FAULKNER.

1. **William Faulkner**, b. May 22, 1777, m. Esther Baker, of Berlin, Mass., b. Oct. 22, 1775, and d. in Chfd., Nov. 29, 1876, at the great age of 101 years, one month and 7 days. In 1814 or '15, he rem. from Berlin to Chfd. He d. in 1855.

Ch.: *Emery*, b. Mar. 10, 1800; m. Bathsheba Frye; d. in Bolton, Mass., Apr. 15, 1880.—*Lydia*, b. Apr. 8, 1802; m. Silas Moore, of Stowe, Mass.—*Diana*, b. July 25, 1804; m., 1833, John Beal (3); d. Aug. 17, 1877.—*Benjamin B.* (2), b. Apr. 29, 1806.—*Mary*, b. Apr. 21, 1808; m., 1824, James Holman (2); d. Aug. 31, 1841.—*William A.*, b. Apr. 5, 1810; m., 1836, Clarissa, dau. of Jesse Hinds (1).—*Sarah*, b. Aug. 29, 1813; d. unm.—*Stephen*, b. Feb. 14, 1816; m. Adaline Holbrook. Res. in Swzy.

2. **Benjamin B.**, son of William (1), m., Aug. 20, 1833, Elizabeth C., dau. of Binea Norcross (3). Res. in Chfd.

Ch.: *Clarissa E.*, b. Mar. 2, 1834; m., July 5, 1857, John Tuttle, of Wincr.—*Lucy E.*, b. Dec. 13, 1835; d. Sept. 7, 1869, unm.—*Mary A.*, b. Oct. 1, 1837; m., Apr. 6, 1856, Walter W. Glazier, of Keene.—*Stephen P.*, b. Feb. 12, 1840; m., Aug., 1865, Melissa H., dau. of John McClenning (q. v.) —*Sarah M.*, b. Apr. 14, 1842; m., May 15, 1870, Romanzo J., son of Rhodolphus Scott (2).—*Lydia L.*, b. July 1, 1846; m., Mar. 7, 1864, Rawson H. Newton, of Hins.—*Martha M.*, b. Feb. 1, 1850; m., Mar. 12, 1868, William W., son of John McClenning (q. v.)

**LATHAM, JAMES**, d. in Chfd., July 8, 1792, in his 84th year.

**LATHAM, ARTHUR**, probably from Wincr., settled in the south-eastern quarter of this town between 1776 and '81. He rem. from the town, probably about 1810, and is said to have d. at Highgate, Vt. His wife was Margaret ——. His ch., so far as known, were: *Arthur*, d. May 1, 1790, in his 22d year. —*Asa*, m. Lydia, dau. of Ezekiel Powers (1). His name disappears about 1800. Two ch. were recorded: Lucinda, b. Aug. 22, 1795, and m., 1820, Otis, son of Wm. Farr (2); Olive, b. Sept. 1, 1797.—*Benjamin.*—*Joseph*, b. June 4, 1778. —*Andrew*, b. Sept. 25, 1781.

## NASH.

1. **ABRAHAM NASH**, probably son of Abraham, who was the son of Benjamin and Ann (Smith) Nash, of Braintree, Mass., appears to have been b. in Taunton, Mass., about 1776, and to have settled in Chfd. about 1812. His wife was Betsey Smith, b. Sept. 15, 1781, and d. Mar. 19, 1868. He d. Feb. 3, 1848, a. 71.

Ch.: *Reuben* (2), b. Aug. 22, 1803.—*Ebenezer*, m. ——; d. in Lee, Mass.—*Lewis*, unm; d. in Chfd., Feb. 15, 1862, a. 52.—*Martin*, d. Sept. 1, 1813, a. nearly 3 years.—*Nancy*, m. Benj. Austin, of Swzy.; froze to death in Chfd., Jan. 24, 1856, a. 42.—*Melinda*, m. Alexander Howard, of Wincr.; d. in Swzy.—*Lydia*, unm.; d. in Chfd.—*George*, m., 1848, Mary F. P. Shattuck. Res. in Brat.

2. **REUBEN**, son of Abraham (1), m., 1825, Eliza W. Howard, of Wincr. Res. in Chfd.

Ch.: *William*, m. 1st, Emily Barber; 2d, Julia Smith.—*Sophia*, d. young.—*Elmira*, m. 1st, Stephen Franklin, of Wincr.; 2d, Mirach Burgess.—*Webster*, killed in battle during the civil war.—*Hannah*, b. July 13, 1834; m. Daniel E. Robbins (q. v.)—*Betsey*, d. unm.—*Eliza*, m. 1st. Leonard Davis, of Gilsum; 2d, John Nash.—*Lucina*, m. 1st, Mirach Burgess; 2d, ——.—*Henrietta*, m. Arthur Johnson.—*Reuben*, d. a. about 18.

# Guide Questions on Latham Cemetery

1. What is the earliest burial?

2. What is the most recent burial?

3. In what decade were the majority of the burials?

4. Who (on the list) were living in 1858?

5. How do materials, designs, shapes of gravestones change through the ages?

6. Measure depth of inscriptions -- early and late.

7. Are there signs of economic, social, age, marital differences in the stones?

8. Measure distance between head and foot stones (where possible). Could this tell you anything?

9. What is the soil like? Any tree growth in yard? Where is the fence?

10. Are there patterns in age of death? Evidence of an epidemic? Average age of death of men? Women? Children?

11. What "titles" were used? When? What abbreviations were used?

12. What were popular first names?

13. What determined who was buried next to whom?

14. In what month or what season were most of the deaths?

15. What are the family groups?

16. How do the spellings on Arthur Latham's headstone/footstone differ?

17. Sally and Lydia Crouch have similar gravestones. Both were wives of Amos Crouch. Could there be any other relationship between them?

18. Which wife is buried next to Amos?

19. How are the Brown's related to the Crouches?

20. Who might be buried next to A. C. Brown (who died in 1836)?

21. How is Nancy Austin related to the Nashes?

22.Why is Betsey Nash's stone next to the stone fence?

23. Why is there a John Beal and a John Beals?

24. Who could be buried between John Beal and Sally Beal?

25. What was the marital status of Sally Beal?

26. How are the Beals and the Faulkners related?

27. Why do Harriet S. and Susan M. Beal share one head stone and one footstone?

28. John and Diana Beal/Beals also had a daughter (a twin of Susan M.) named Harriet A. Beal. What does this tell you about 19th century custom?

29. There are five epitaphs. What are they? What can you learn about these people from them?

30. James and Arthur Latham's relationship is not known according to Chesterfield town history. What could it be?

31. Why do some of graves face up the hill and some down the hill?

32. Could any of the men have served in Revolution 1775-1783, War of 1812-1814, Civil War 1860-64?

33. Why do you think the people of Hardscrabble selected this spot for one of their three cemeteries.

| NAME | AGE IN 1858 (if alive) | BORN PLACE | AGE | FATHER | MOTHER | BROTHERS SISTERS | SPOUSE/S | OFFSPRING | RESIDENCE OCCUPATION | GRAVE TYPE OF STONE | OTHER INFORMATION |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Nancy Austin | | | | | | | | | | | |
| Diana Beal | | | | | | | | | | | |
| Harriet S. Beal | | | | | | | | | | | |
| John Beal | | | | | | | | | | | |
| John Beals | | | | | | | | | | | |
| Lydia Beal | | | | | | | | | | | |
| Mary Beal | | | | | | | | | | | |
| Sally Beal | | | | | | | | | | | |
| Susan M. Beal | | | | | | | | | | | |
| Aaron C. Brown | | | | | | | | | | | |
| Albert C. Brown | | | | | | | | | | | |
| Amos Crouch | | | | | | | | | | | |

**Latham Cemetery Chart**

| NAME | AGE IN 1858 (if alive) | BORN PLACE | AGE | FATHER | MOTHER | BROTHERS SISTERS | SPOUSE/S | OFFSPRING | RESIDENCE OCCUPATION | GRAVE TYPE OF STONE | OTHER INFORMATION |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Clark Crouch | | | | | | | | | | | |
| Lydia Crouch | | | | | | | | | | | |
| Sally Crouch | | | | | | | | | | | |
| Benjamin B. Faulkner | | | | | | | | | | | |
| Elizabeth Faulkner | | | | | | | | | | | |
| Arthur Latham | | | | | | | | | | | |
| James Latham | | | | | | | | | | | |
| Abraham Nash | | | | | | | | | | | |
| Betsey Nash | | | | | | | | | | | |
| Lewis Nash | | | | | | | | | | | |
| Martin Nash | | | | | | | | | | | |

Latham Cemetery Chart

# Essay: Gravestone Design

From the material, the position, inscriptions, symbols, and the design of old gravestones we can learn much about the taste and technology of earlier generations.

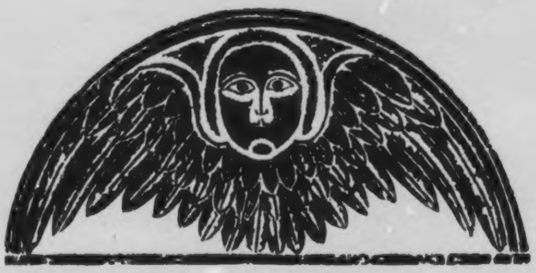
Early colonial gravestones were made of slate because deposits of this layered rock abound throughout New England. Slate continued in use until the beginning of the 19th century. When quarries were opened, cut blocks of marble and granite replaced slate as grave markers. Sometimes the inscriptions carved into late gravestones have weathered more slowly than those cut into granite and even marble.

Gravestones were, and are today, positioned over the head of the buried person. In olden times, foot stones were also purchased. The distance between a head and a foot stone can be used to determine if the grave is that of an adult or of a child.

Children and parents were usually buried near to one another in a family plot. Titles such as Mr., Rev., Captain, or Deacon were used to identify men of stature in a community. Mrs. was sometimes carved into a wife's stone. Wives were identified by their married (Mrs. Sally Baker, wife of Adam Baker). If a woman died a widow, her gravestone may identify her as "relict"; a "consort" was a legal wife. Children's tombstones were small; by position and by inscription their parents were clearly identified.

A gravestone, whether for a child or an adult, almost always bears the date of the death and the age of the deceased at death, but birthdates do not usually appear on stones.

The carving of stones was a specialty, though stonecutters were not usually employed full time at their craft. Thus a stonecutter might be a wood carver, wheelwright, or printer. The names of carvers seldom appear on their work, but styles of stone engraving are studied as American folk art and the stones cut by one artisan have features in common.



The carver of gravestones was called upon to render in an indelible way what everyone recognized as a fragile and temporary existence. Gravestones were meant to last as a reminder of what did not last. Symbols of mortality and destiny were common on early gravestones.

A Death's-head, a skeleton-like face often accompanied by wings, was used in the 18th century to symbolize human mortality. In the 19th century a hand with the index finger pointing heavenward indicated the soul's destination. Other 19th century symbols included urns and weeping willows. Flowers were sometimes cut into the gravestone of a child.

We cannot know exactly what the various symbols may have meant to former generations, but it is safe to say that two ideas dominated their thinking about death in general. All human beings are mortal and no one was better acquainted with sudden and sometimes hideous death than our 18th and 19th century forebearers. For example, Nancy Nash Austin, a resident of the Latham Cemetery froze to death in 1856.) But death was tempered by an almost universal trust in the resurrection and the immortality of the human soul. Because life was seen as a trial and test of one's worthiness to ascend into heaven, the worldly accomplishments were sometimes memoralized on gravestones. Reference books will offer interpretations of gravestone symbols, but it is intriguing to speculate on the meaning of the symbols one encounters in a visit to a graveyard. Who knows, perhaps an amateur's speculation can come as close to a symbol's meaning as a student of the subject. It should not be overlooked that designs may be little more than a craftsman's urge to demonstrate his taste and skill.

Epitaphs, like visual symbols, were intended to instruct the living. They are easier to interpret than symbols and are surprisingly revealing in their insight into the trials of human existence. (Epitaphs carved into the gravestones in Latham Cemetery are included with this unit.)

The study of an old graveyard can provide a glimpse of life, taste, values, social organization, religious beliefs, and economic structure of a community. A respect for another way of life comes with a close study of early gravestones.

# Latham Cemetery Epitaphs

In Memory of Mrs. Sally Crouch, wife of Mr. Amos Crouch
Who Died Feb. 15, 1825 Aet. 47
By Death They Enter to Those Joys (weeping willow)
Prepared for Them Above
There they Are Swallowed Up
In Endless Life and Love

In Memory of Mrs. Lydia Crouch, wife of Mr. Amos Crouch
Who Died Jan. 3, 1812 in the 39th Year of her Age
My Savior Shall My Life Restore
And Raise Me from My Dark Abode (weeping willow)
My flesh and Soul Shall Park No Mor$^{e}$
But Dwell Forever Near My God

Amos Crouch Died Aug. 18, 1861 Aet. 92
Asleep in Jesus Blessed Sleep
From Which None Ever Wakes to Weep
A Calm and Undisturbed Repose
Unbroken By The Last of Foes

John Beal Died Aug. 26, 1829 Aet. 69
Eternal Life This Fiils My Mind
While I Myself Deny
All Earthly Things Are Now Resign'd
I'll Better Riches Try

In Memory of Mr. Arthur Latham Who Departed This Life
May $\overset{e}{y}$ 1st 1790 in $\overset{e}{y}$ 22$^{d}$ Year of His Life
Time was I stood Where Those Do'st Now (Death's Head)
And View'd The Dead As Thou Do'st Me
Ere Long Thou'll Lie As Low As I
And Others Stand And Look on Thee

## Activity: Cellar Holing

### Introduction

Cellar holes are storehouses of historical information. Without disturbing the land and with a minimum of equipment and background, students can explore the past through the study of these man-made structures.

Cellar holes seldom appear alone and isolated from stonewalls, impressions left by paths and outbuildings, trees, shrubs, roadbeds, and dam sites. Taken together they reveal a wealth of information to the amateur archeologist with an active imagination.

While this activity is based on field work carried out in Pisgah State Park, the procedures are applicable to the study of cellar holes anywhere. The more historical documents that can be made available to students the better. This unit provides much of this information for the area known as Hardscrabble located on the eastern edge of the park.

### Materials

Instructions and data sheets (pp 139) should be duplicated for each of the three teams.
Meter sticks and tapes.
Large sheets of newsprint - one or more per team.
Pencils

### Preparation

A word of caution is in order. Working around cellar holes, wells, and stonewalls is potentially hazardous. Students should be forewarned to watch out for loose stones and overgrown holes. Students determined to carry out their study respectfully and without disturbing the evidence will be careful of themselves in the process.

Visiting the site ahead of time, will reveal any dangerous places, poisonous plants, wasp nests, etc., to the leader. Inform the park manager, Cecil Parker of your plans (603) 352-0611). Assign "Cellar Holes: Clues to the Homestead" for reading a day or two before the scheduled trip. Refer to the Pisgah Succession Walk for suggestions on field trip sites (p 83 ).

### Procedure

Form three groups. Each group will receive an instruction and data sheet, newsprint, and measuring devices. Discuss the procedures with each group and assist them in organizing for the study. Point out any documents and maps that may help them.

### Following Through

After the data collecting is complete, students should work together to prepare a site map.

Discuss the lifestyle of the last users of this site as it is revealed by the evidence collected.

## Data Sheet

Cellar Holing - Group I: The Homestead

### Instructions

Your task is to lay out on paper the area that includes the house and dooryard. Decide on a convenience scale and measure length, width and depth of the structures. Record these on a carefully drawn sketch of the homestead.

### Data

1. Dimensions of cellar hole.
2. Dimension of building if it extended beyond cellar hole.
3. Material used to construct walls and foundations.
4. Material used to bind construction material.
5. Chimney/fireplace dimensions and location.
6. Chimney/fireplace construction.
7. Location of main doorway (look for flat, broad stone).
8. Orientation of building (compass heading of main doorway).
9. Types of patterns of cultivated trees and shrubs (lilac, roses, day lilies, fruit trees, shade trees.) Marriage trees are paired plantings on either side of the doorway put there by the bride and groom.
10. Check carefully for artifacts (shaped wood, metal, pottery, glass).

# Data Sheet

Cellar Holing - Group II: Outbuildings and Water Supply

## Instructions

Your task is to locate and sketch to scale two or more outbuildings (shed, barn, saphouse, chicken house, wagon shed, privy, etc.) Some will have cellar holes, others only foundation footings. Some may only have stood on the ground and the evidence will be at best a rotten sill or impression in the ground. On newsprint record the location and dimensions to your chosen scale.

## Data

1. Dimension of cellar holes/ foundations.

2. Dimension of building if it extended beyond cellar hole.

3. Material used to construct walls and footings.

4. Material used to bind construction material.

5. Location and direction of doorways.

6. Suggest function of buildings.

7. Locate water supply (well, spring, stream). If a well, note construction of walls. Measure distance from house and/or outbuildings.

8. Locate dump site. Check for discarded items (use gloves!).

9. Measure distances between buildings and between house and major outbuilding.

10. Check carefully for artifacts and construction technique.

# Data Sheet

## Cellar Holing - Group III: Fields and Roads

### Instructions

Your task is to map out as much of the land at the site as you can. Select a scale appropriate to the overall site and carefully sketch the area on a sheet of newsprint.

Pacing may be the easiest way to determine dimensions. Measure your normal walking pace (take five normal steps and measure the distance covered; divide by five to determine your pace).

### Data

1. Dimensions and compass orientation of two fields enclosed by stonewalls.

2. Note use of barbed wire (check tree trunks along stonewalls for wire).

3. Note construction of walls. (Many small stones suggest the field was cleared for plowing and seeding. Large stones suggest the field was cleared for pasture). A large, branching maple or pine among straighter, taller trees may once have shaded livestock in the pasture.

4. Note stonepiles that indicate efforts to clear land.

5. Measure length and thickness of any particular large stones used to build the wall. Note if these stones could be moved by men or whether animals would be required.

6. Locate and measure barways and gateways. Note evidence of method for holding bars and hinging gates.

7. Locate and measure width of roads (a wall or line of trees often marks edge of roadways) within and without the site. (Public roads were measured in rods - 16.5 ft. - and more frequently used roads were wider than roads with little traffic.)

8. Locate and sketch out paths and lanes on the site.

9. Look for line trees (maples, hickories, or oaks forming a line along a stonewall.) These may indicate the edge of a land holding.

10. Check carefully for artifacts and construction techniques.

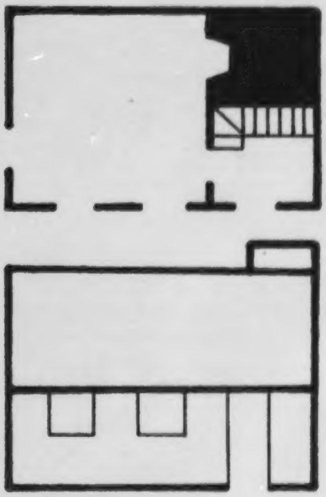
PAGES 142-144 REMOVED DUE TO COPYRIGHT RESTRICTIONS.

# Essay: Architecture of New England-Late 18th, Early 19th Centuries

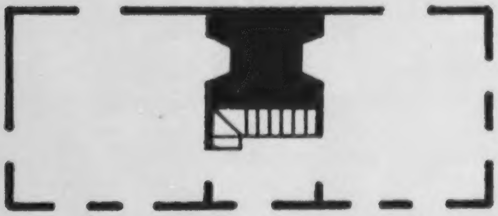
A basic knowledge of early American house construction will help to visualize the structure that once covered old cellar holes.

## The House Plan

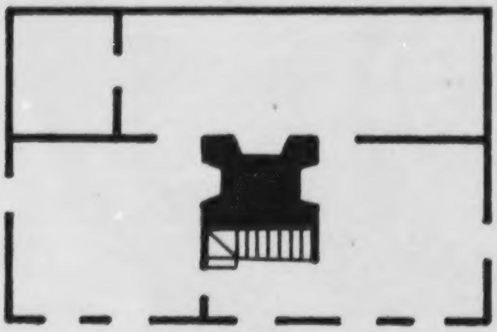
A. Earliest - one room, corner chimney, loft above.



B. The center chimney. Another early plan was an extension of the above corner chimney style. A second story was sometimes added.



C. Salt Box. Finally a kitchen was added with a shed roof above.



## The Foundation

The earliest house foundations were made by laying up fieldstones without the use of mortar. This practice required careful selection of the stone and these cellar walls took a long time to build.

Later, mortar was made of wood ashes to hold the stone in place and building walls went along faster. Still, care had to be taken to fit the many-shaped fieldstones together. About three times as many stones were collected as ended up being used.

Quarried stone, pieces cut with square edges and charp corners, was not available until the beginning of the 19th century, and even then cut stone was not obtainable everywhere. Sometimes a cut doorstep or hearthstone appears in an otherwise all natural stone foundation.

Brick was used in foundations later in the 19th century, but was utilized earlier if a brick kiln was nearby. The earliest bricks were made from clay dug up in the process of excavating the cellar. Otherwise, brick had to be transported and the material never reached some hill top communities.

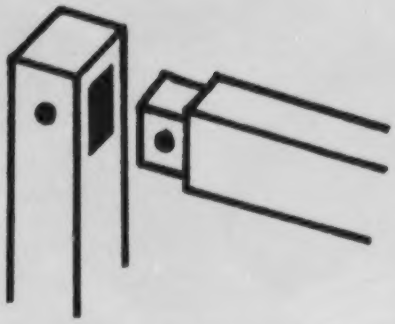
Thus, by looking at the material one can get a fair idea of the time when a foundation and cellar was constructed.

In the construction of a house, sometimes a cellar was dug under only part of the structure. If a cellar hole seems too small for a family dwelling, look about carefully for remains of the larger foundation.

## The Frame

Large beams and posts were hewn by hand out of logs and cut to be fastened together by mortise and tenon. One end of a timber was shaped so that a square peg (tenon) extended from it. Another beam had a square hold (mortise) in it to receive the square peg. A wooden dowel, called a trunnel or "tree nail," was inserted into both pieces to hold the tenon in the mortise.

The frame for each wall was assembled and the mortise and tenon joints fastened on the ground. The walls were then raised up by groups of men working together. (The "raising" was a social opportunity for 18th century families to get together for work and fun.) Trunnels were driven into the corner mortise and tenon joints to hold the walls together. Roof rafters and chimney construction followed the raising. A great beam called a "summer" supported the second floor. It ran parallel to the front side of the house and one end was often anchored in the masonry of the chimney and fireplace. Sometimes the second floor extended over the first.



## Chimneys

The remains of chimneys and fireplaces are a prominent feature of old cellar holes. The placement of fireplaces gives an indication of the period of construction as does the building material. The cruder the bricks, the earlier and perhaps more local were their manufacture. Fireplaces and chimneys frequently have their foundation in the cellar, but can sometimes be found sunk well into the ground (to prevent frost heaving) within the area surrounded by the house foundation. Though chimneys and fireplaces topple when exposed to the elements, their foundations exist for a long time and from the size of the base one can imagine the size of the whole structure.

Some chimneys had as many as four or more fireplaces built into them. Usually a deep fireplace indicates the location of the cooking area (kitchen) while shallower fireplaces indicate the placement of halls, parlors, bedrooms, and chambers. A domed baking oven frequently was built beside or inside the cooking fireplace where heat, but not flame, would be concentrated. A smoke chamber higher up in the chimney held meat and fish in the smoke from the fireplaces. Smoke preserved the meat.

With a little imagination and a knowledge of 18th and 19th century architecture, one can gain a fairly complete picture of a homestead from the clues hidden in the cellar holes and foundations.

These topics are suggested for further study:

(a) Federal style of architecture.

(b) Georgian style of architecture.

(c) Roof styles (salt box, gambrel, hip, mansard, etc.) and roofing materials (wood shingles, slate, metal, composition).

(d) Connecticut Valley Doors.

(e) Early New England kitchen equipment.

(f) Early New England furniture styles.

# Activity: Recreating a Community

## Introduction

After a visit to an old graveyard and/or an old farm cellar hole, more information about residents of the community can be gained from old documents. Wills are a good source of information.

It so happens that not one person buried in the Latham Cemetery made a will that has been recorded. Several facts suggest themselves by way of explanation: records of early wills are incomplete, informal wills were never recorded, possessions and property were "handed down" before death and finally, in many cases there was little to leave to descendants.

Amos Crouch, however, had a third wife who is not buried by him in the Latham Cemetery. Information about her is in the extract from the Chesterfield History. A fascimile of Abigail Crouch's will accompanies the first activity (p151).

## Part A

1. Ask students to read about Abigail Crouch in the Chesterfield History.

2. Ask students to read the will of Abigail Crouch.

3. Discuss the following questions:

(a) What does her will tell us about Abigail's values and interests?

Research tells us that members of Abigail Holbrook Crouch's family lived in Swanzey. Abigail probably attended the Baptist Church in West Swanzey. The first death entered in the records of the Baptist Church of Swanzey was under the date of January 3, 1812: "Sister Lydia Crouch", (Lydia was the first wife of Amos Crouch).

(b) What does her will tell about the community as a whole?

(c) What explanation can be given for Abigail's not mentioning her husband (who was still alive at the time of her death) in her will?

Hint: Compare his age to hers.

(d) Why were the Drapers asked to witness the will? The Chesterfield History shows that the Drapers and the Crouches were closely related. Samuel L. Draper's wife was the sister of Amos Crouch, and Samuel L. Draper's daughter, Sarah, married John Crouch, one of the sons of Amos Crouch and his first wife.

## Part B

The estates of two of the people buried in the Latham Cemetery were "administered". Aaron C. Brown, who was married to Lucy Crouch, (the daughter of Amos Crouch) died in 1836 when he was 29 leaving his widow with four young children. Twenty-two years later in 1858, Albert C. Brown, (one of these children) died unmarried at the age of 26. The two inventories provide significant information about the changing economic and social conditions of this period.

Students read the two inventories. Questions like the following might be asked:

(1) On what activity was the economy of Hardscrabble based:

(2) What evidence of products and methods of production is given?

(3) What can be learned about the position of women in this society?

(4) What was considered valuable? What is missing? (Why is there no ox listed?) A cow?

(5) What can be concluded from a comparison of the two inventories? (Compare the personal possessions, the cost of digging the graves.)

Following Through

Research can be done on many items listed in the inventory. Some guide questions may help direct the research:

What is a whippletree?
What are pantaloons?
What is a frock?
Why would Aaron C. Brown have a military uniform and equipment?
What are the prices today of some items listed (dung fork, saddle, loom?)

Part C

Students' research and oral/written reports on some aspect of 19th Century farm life could conclude this recreation of the community. Topics suggested by life in Hardscrabble include the following:

- sheep raising
- food (production, preparation, preservation)
- home furnishings
- house and barn construction
- school
- farming equipment and techniques

A useful filmstrip is Growing Up Homespun.* Although it deals with life in rural New York it gives a broad picture of the various farm activities carried on throughout the year by men, women, and children.

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**New York State Historical Association, Cooperstown, New York 13326*

## Essay: Using Public Records

This unit provides some examples of the wealth of materials contained in our public records. If you cannot get to the Latham Cemetery, you can study a local cemetery and/or cellar holes. Records from your local county court house will bring the research to life. There are three types of county records your class will find especially valuable:

(a) Court cases

(b) Deeds and land transactions

(c) Probate records - wills and "administrations." (These are documents describing the disposition of the deceased's estate when no will was made. These usually contain inventories.)

All these records are available for public use. In New Hampshire the clerks in charge of these records are elected officials. They are helpful people and usually welcome student visitors. It is simple courtesy to arrange group visits before hand. You or individual students will receive interested assistance at any time during office hours.

Other records, such as vital statistics (births, deaths, and marriages) are maintained by town or city clerks. Old records may have been collected and printed. These can be found in libraries and are catalogued by local and state historical societies.

Most recent records appear in annual town reports. The accessibility of such records, as well as tax lists, will depend on how local officials view their job - most are generous in their assistance.

Town histories, genealogies, diaries, and church records are good sources of information about those buried in all graveyards.

Older residents who know about the area being studied can be a rich resource. Many can tell you not only about people, but about a way of life almost totally changed. Collecting local history through the interview method is a recognized research technique and a great deal of fun, to boot.

# The Will of Abigail Crouch

In the name of God Amen, I Abigail H. Crouch of the town of Chesterfield, State of Newhampshire, County of Cheshire, considering the uncertainty of this mortal life, and being of sound mind, and memory, blessed be Almighty God for the same, do make and publish this as my last Will and Testament in a manner and form following. First I give and bequeath to unto the Babtist Home Mission in the aforesaid State, five dollars, also my gold beads, I also give and bequeath unto my Brother Rufus Holbrook, ten dollars and my best bed, I also give and bequeath unto my deceased Sister Lydia Thayers daughter, Emily Campbell, my large silver spoon, also a suit of clothes, I also give and bequeath unto my deceased Sister Elmira Dwinnells two daughters, Emily and Mary Ann, each three silver teaspoons, also a suit of clothes each, I also give and bequeath unto my deceased Sister Susanna Parkers son Joseph, my poorest bed and best bed stead. And lastly as to all the rest, residue and remainder of my personal estate, goods and chattels of what kind and nature soever, I give and bequeath the same to my Brother Millen Holbrook, whom, I hereby appoint sole executor of this my last Will and Testament.

In witness whereof I hereunto set my hand and seal this sixth day July in the year of our Lord one thousand eighthundred and fifty seven.

Abigail H. Crouch

Signed, sealed, published and declared by
the above named Abigail H. Crouch to be her
last Will and Testament in the presence of us who
have hereunto Subscribed our names as witnesses
in the presence of the testator. samuel L. Draper
Laura Draper
Sarah M. Draper

# Aaron C. Brown d. Sept. 22 1836 Estate Administrated

A. "To the judge of probate for the county of Cheshire Lucy Crouch, widow of Aaron C. Brown, late of Chesterfield declines the service of administrating on said estate and recommends to your honor Samuel L. Draper of said Chesterfield as a proper and suitable person to be appointed to that trust. Chesterfield Sept. 26., 1836."

B. Inventory Aaron C. Brown d. Sept. 22, 1836 (aged 29)

Personal Estate

| | |
|---|---|
| Horse | 50.00 |
| Horse-wagon | 9.50 |
| Harness for one horse | 4.65 |
| Ox cart | 5.33 |
| Ox plough | 2.83 |
| Horse plough | 1.25 |
| Iron bar | 1.50 |
| Draught Chain | .75 |
| Log chain | .58 |
| Barn shovel | .42 |
| Dung fork | .50 |
| New axe | 1.33 |
| Old axes | 1.00 |
| sled | .50 |
| Rakes | .08 |
| Scythe | .06 |
| Scythe snaths | .12 |
| Bark iron | .25 |
| 1 string of bells | 1.00 |
| Pitch fork | .25 |
| Hoe | .20 |
| Whippletree | .06 |
| Ring & staple for ox yoke | .20 |
| Plane Iron | .10 |
| Box of old Iron | .12 |
| 2 Cranes | 1.50 |
| Buffalo robe | 4.50 |
| Pair & iron | .50 |
| Gun | 3.00 |
| Military equipment | .12 |
| Halter | .09 |
| Loom | 1.50 |
| Cheese press | .12 |
| 4 Old Barrels | 1.00 |
| Set dry measures | .25 |
| Churn | .37 |
| Table | .50 |
| Quill-wheel | .25 |
| Saddle | .50 |
| Cask of vinegar | 1.00 |
| Hand saw | .50 |
| Lot of upper leather | 1.25 |
| Lot of sole leather | .75 |
| Pair thin boots | 3.50 |
| Pair thick boots | 2.00 |
| Corn basket | .40 |
| Clothes basket | .17 |
| Horse basket | .50 |
| 3 Dining chairs | .85 |
| 6 Kitchen chairs | 1.00 |
| Table | .25 |
| Cookery Ware | 3.50 |
| Glass Ware | .25 |
| Knives & forks | 1.25 |
| Spoons | .50 |
| Tin ware | 1.50 |
| Fire shovel & tong | .67 |
| Clock | 6.00 |
| Hollow Iron ware | 3.33 |
| Coffee Mill | .37 |
| Milk pail | .12 |
| Water pail | .12 |
| Rasor-Box & strop | .50 |
| Sickle | .17 |
| 2 Candle sticks | .20 |
| No.1 Bed,bedding & bedstead | 9.00 |
| Bed - quilt | 1.25 |
| Comforter | .50 |
| Bed - quilt | .75 |
| Bed - quilt | 1.00 |
| Coverlid | 2.50 |
| Quilt | .50 |
| 2 tablecloths (25¢ each) | .50 |
| Diaper tablecloth | .46 |
| Tablecloth | .75 |

| | |
|---|---|
| Towel | .12 |
| 10 pr. pillowcases | 1.25 |
| 5 pr. cotton sheets | 3.45 |
| pr. linen sheets | .40 |
| No.2 Bed-Bedding & bedstead | 11.62 |
| Shirt | .40 |
| Military Uniform | 2.50 |
| Vest | 1.37 |
| Great coat | 2.00 |
| Strait coat | 6.00 |
| Pantaloon (blue) | 1.25 |
| Silk vest | .40 |
| Old vest | .25 |

| | |
|---|---|
| Pantaloon | .25 |
| Old Coat | .25 |
| Frock | .30 |
| Striped pantaloon | .50 |
| pair footings | .17 |
| Hat, stock 7 2 neck cloths | 2.50 |
| Chest | 1.50 |
| Flat Iron | .25 |
| Mealbag | .17 |
| Brass Kettle | 1.50 |
| Cash on hand | 60.60 |
| | $248.65 |

John Crouch--appraiser with
John P. Henry and
Reuben Willard

Nov. 1, 1836

Money owed him and paid - $172.90 (no property value listed)

C. The following expenses were charged to the estate

| | |
|---|---|
| Funeral charges | |
| paid R. Hopkins for coffin for deceased | $ 3.00 |
| paid John Beal for digging grave | 1.25 |
| | $ 4.25 |

| | |
|---|---|
| On account for supporting infant children of the deceased under seven years of age | 267.60 |
| Money owed by him | 262.31 |

# Albert C. Brown d. Feb. 8, 1858 Estate Administrated

A. Lucy Brown (his mother) and Lucy C. Brown (his sister) appointed Amos E. Brown (his brother) to administer the estate, Amos C. Crouch (his uncle) was the appraiser of the estate.

One half of the "home place" was sold to Lucy Brown
One half of the Stone lot was sold to Lucy Brown

B. Inventory of Albert C. Brown died Feb. 8, 1858 (age 26)

| | | | |
|---|---|---|---|
| Real Estate | Homeplace 8 acres, one half 4 acres | | 100.00 |
| | Stone lot 18 acres, one half 9 acres | | 58.50 |
| Livestock | 1/2 Horse | 20.00 | |
| | 1/2 of one yoke of 4 old oxen | 50.00 | |
| | 1 yearling | 8.00 | |
| | 1/2 of two old heffer | 11.00 | |
| | | 89.00 | |
| Provisions and Produce | | | |
| | 1/2 of 40 lb. of salt pork | 2.00 | |
| | 1/2 of 79 bushels of corn | 3.19 | |
| | 1/2 of 16 bushels of potatoes | 2.67 | |
| | 1/2 24 hundred of English hay | 6.00 | |
| | 1/2 1 ton of meddowhay | 2.50 | |
| | | 16.36 | |
| Farming Utensils & Mechanics Tools | | | |
| | 1/2 of two waggons | 2.75 | |
| | 1/2 of 1 slay | 1.00 | |
| | 1/2 of 1 Grindstone | .37 | |
| | one half one axe | 1.00 | |
| | Shop tools | .50 | |
| | | 5.62 | |
| Wearing Apparel | | 8.25 | |
| Miscellaneous Articles - one trunk | | 1.50 | |
| | | | 279.23 |

Samuel Goodridge)
John Crouch ) Appraisers
Amos I Crouch ) Feb. 23, 1858

C. The following expenses were charged to the estate

Debts - $104.70

Funeral Expenses - $8.50

| | |
|---|---|
| Coffin | 5.50 |
| John Beal digging grave | 2.00 |
| Rufus Smith* for attending funeral | 1.00 |
| | 8.50 |

John D. Brown for Gravestones - $10.00

A. C. Crouch - Journey to Westmoreland for Gravestones and helping put same - $2.00

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* Rev. Rufus Smith served the Swanzey Baptist Church from Aug. 31, 1856 - Feb. 19, 1859

# Activity: The Death of Hardscrabble

Introduction

This three part activity reminds students that the face of the land changes with increasing rapidity. Part A points out that in their short lives they have seen many changes. In the past it took perhaps a decade or a generation to witness change. Looking at population statistics is one way historians discover patterns of change in the past. In Part B students are asked to make generalizations based on the changes in population of three towns near Hardscrabble. By inductive reasoning they will come to see the forces acting on the people of that hamlet in the hills.

To confirm their conclusions as to causes of the passing of the hill farm community, students will compare and contrast their field observations and document research with one historian's study of New England farming villages. In 1936 Harold Fisher Wilson wrote The Hill Country of Northern New England. The book is considered to be a classic in economic and social history of the region. Unfortunately, the book is now out of print, but copies can be found in most college libraries.

Part C of this activity asks that students assess generalizations based on Wilson's research, marking each one as to its applicability to the settlement the class has studied. Various ways of using the statements will suggest themselves, but much will be lost if there is not some opportunity to discuss them in class. The generalizations themselves are not above criticism.

## Part A: A Personal Inventory of Change

Introduction

There is no question but that the pace of social changes has accelerated in recent times. Thus a student's personal inventory of changes that have taken place in his or her lifetime will serve as a micro-model of lands and social history on a bigger scale. Students who come to see history as something happening right under their feet will develop a deeper appreciation for the task of reconstructing the past.

Procedure

Ask students to list changes in the physical appearance of their town or community that they have personally experienced. (Working individually instead of in groups will generate more examples.)

Ask students to list changes in social services, lifestyles, means of communication (nonphysical items) they have direct knowledge of.

Students compare lists and prepare a composite in an effort to identify any trends among these changes.

## Following Through

Use the trends that show up in discussion to project into the future or into the more distant past.

## Part B: The Death of Hardscrabble

Generalizations based on Harold Fisher Wilson's book The Hill Country of Northern New England: Its Social and Economic History 1790-1930, New York: A.M.S. Press, Inc., 1936. rpt. 1967.

## Introduction:

In 1936 Harold Wilson published a study of the social and economic development of Northern New England from shortly after the American Revolution to the first half of the 20th Century. (By Northern New England he meant primarily the states of Vermont, New Hampshire, and Maine.)

From your work with this unit you have learned how much the uses of our land have changed. You may have discussed some of the social and economic reasons that caused change. Wilson's book is all about these kinds of changes.

The generalizations are based on his book. He intended them to apply to Northern New England. But do they apply to Hardscrabble as you investigated it? We must be careful to evaluate the evidence you actually have collected in the Latham Cemetery, from the cellar holes, from the town history and from court records such as wills and the statistical tables.

## Procedure

For each generalization below these symbols are to be used to indicate the amount of agreement between the generalization and what you know of Hardscrabble:

✓ means you found evidence that this generalization applies to Hardscrabble

? means that this generalization may be similar to Hardscrabble but that your evidence is inconclusive

X means that this generalization does not apply to Hardscrabble or that you found no evidence that it would apply

Be able to cite your evidence, or in the case of a "?" or "X" to be able to say what evidence is lacking.

**Mark here**

1.____The period of the most rapid growth in farmland occupation was 1790-1830.

2.____Much of the best land was owned and/or under cultivation before the American Revolution.

3.____Shortly after the Revolution the hilltops were cleared and occupied by farmers.

4.____The farms of this period were self sufficient - there was little or no surplus of products to trade.

5.____Crops such as wheat, corn, and garden products were grown. Livestock such as cows, pigs and sheep were raised in small numbers.

6.____Life was hard. Men worked constantly. Women were "worked to death".

7.____Life was lonely. The first settlers chose hillsides so they could look out and see other farms.

8.____The hilltop farm was not suited for efficient production because the land was so rough and steep only hand tools could be used. Mechanization was impossible.

9.____The argument that farming died out because the land became exhausted is only partially valid. The hilltop farm was not very fertile to begin with and there is little evidence that farming made the land permanently infertile.

10.____The farmers were too inflexible to adopt modern farming methods.

11.____There is partial validity to the argument that lethargy was caused by poor dietary habits - greasy cooking, over dependence on potatoes and red meats, rich pies, and a lot of hard cider. This diet was typical of most farmers throughout the United States in the 19th Century.

12.____Selective migration meant the young and talented left the farms. Constant intermarriage of those in the isolated areas led to genetic problems. In addition deterioration of buildings and the breaking up of families was contagious. Those left behind became discouraged.

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Photo courtesy of Robert and Jane (Dickinson) Bennett

13._____Growth was not steady from 1790-1830. The year 1816 was called "the cold year" or the "famine year". There was a total crop failure due to severe frosts and snow in June.

14._____From 1810-1830 the number of sheep increased because a superior breed, the Merino, was introduced from Spain and because wool was needed by the textile industry which had begun along the New England Rivers.

15._____From 1830-1870 the young people began to move away. Men went west, some to settle Kansas, some to the California Gold Rush of 1849. Women went to work in the textile mills (such as in Lowell, Massachusetts, where they could make $3-$6 a week).

16._____Better transportation (first the Erie Canal and then the railroads) meant that the agricultural products of the west could reach the east. These western products were cheaper because farming in the west was easier and more productive.

17._____During the Civil War many young men left the farms. Some were killed; others preferred not to return to a life on the farm. (Less than half returned permanently.)

18._____After 1840 the sheep industry declined because it was cheaper to raise sheep in the West ($.25 to $1.00 per head) and transport them than it was to raise sheep in the East ($1-$2 per head.)

19._____After 1840 people were not content to live on self sufficient farms. They wanted some of the manufactured goods only a surplus production could purchase.

20._____After the coming of the railroad (the Cheshire Railroad came to Keene in 1848) towns reached by the railroad flourished; towns and other areas bypassed by the railroad declined.

21._____After 1830 agriculture became more specialized and intensive on the better pieces of land. Eggs, poultry, milk, perishable vegetables, sweet corn, apple, maple products were produced as cash crops.

22._____The dairy industry particularly developed as the city markets (Boston) opened up after 1850. Only the better farm land was useful for quantity dairy production.

23._____Attempts by state governments at the end of the 19th Century to encourage farming, to encourage immigration from such places as Canada, did not significantly stop the abandonment of the farms.

24._____Beginning in 1850 timber was cut from the abandoned farm land. Great quantities were used in railroad construction and, before coal, for fuel.

25._____Beginning about 1900 the deserted farms began to be purchased by summer residents.

## Following Through

Hold a group discussion of this statement: Hardscrabble (or whatever settlement has been researched) died primarily because:

(a) the land was worn out

(b) hilltop farming was an impossible venture from its inception

(c) the lure of the mill and urban life drained away the youth

(d) western lands were more productive

## Part C: Analysis of Population Statistics

Examining population statistics can be a revealing activity. The task for the students is to draw from numerical data some basic generalizations.

Start by looking at one town's population. What can be learned about the history of that town? Try to refrain from suggesting reasons for the population trends at this point.

Then compare and contrast the population of the various areas and draw generalizations from the class based on these comparisons.

Finally considering all the generalizations, suggest reasons for the population trends over time and for the similarities and differences between areas.

# POPULATION STATISTICS

| Year | Chesterfield N.H. including Hardscrabble | Keene N.H. | Brattleboro Vt. | Northfield Mass. |
|---|---|---|---|---|
| 1760 | - | 430 | - | 415 |
| 1767 | 365 | - | - | - |
| 1780 | 747 | 756 | - | 868 |
| 1800 | 2161 | 1645 | 1867 | 1047 |
| 1820 | 2110 | 1895 | 2017 | 1584 |
| 1840 | 1765 | 2610 | 2624 | 1673 |
| 1860 | 1434 | 4320 | 3855 | 1712 |
| 1880 | 1173 | 6786 | 5880 | 1603 |
| 1900 | - | 9165 | 6640 | 1966 |

(- statistics missing)

# Activity: Valuing a Life-Style

## Introduction

How do you decide whether one way of life is better or worse than another? Is there a good reason for trying to value a way of life? Why do we hear so much about 'the good old days'? Why are we so nostalgic for the past? Do people ever believe that 'things will be better later on'? In this activity students are asked to consider the good and the bad in the good old days. While the discussion is primarily about a former way of life, inevitably contemporary values and styles will be drawn in.

## Procedure

A. Read John Greenleaf Whittier's poem, The Homestead. What is the narrator's view of life in bygone times? What is his opinion of modern life? According to the poem, what is the most valuable thing people can do with modern machines and chemicals? How long ago did Whittier write this poem? What are problems and blessings that machines and chemicals have brought us that the poet did not anticipate?

B. Ask students to speculate about what would have been some values shared by the residents of Hardscrabble.

C. Ask students to speculate about the values they share with the residents of Hardscrabble.

D. Working in small groups students list all the desirable things about life in Hardscrabble in 1858. Students make lists of all the disadvantages of life in Hardscrabble in those days. Working from the group lists, the class can prioritize the items in a sequence from "best" to "worst". In the process, disagreements and considerations of students values will help to relate the old and the new.

## Following Through

As a tribute to the old timers and as a way of reconstructing the past, students might consider "adopting" an old cemetery. Students might map the graves for future reference. Clearing brush, rebuilding walls, clearing gravesites and resetting stones has been undertaken by some high school classes. This should be done only under expert supervision, with permission and oversight of those in charge of the graveyard.

Advice in this activity should be obtained from New Hampshire Graveyard Association, c/o Mrs. William H. Emhardt, Star Route, Barrington, New Hampshire 03825.

# The Homestead

### By John Greenleaf Whittier

Against the wooded hills it stands,
Ghost of a dead home, staring through
(lights=window) Its broken lights on wasted lands
Where old-time harvests grew.

(scythe=blade) Unploughed, unsown, by scythe unshorn,
The poor forsaken farm-fields lie,
(rife=full) Once rich and rife with golden corn
And pale green breadths of rye.

(bereft=lost) Of healthful herb and flower bereft,
The garden plot no housewife keeps;
Through weeds and tangle only left,
The snake, its tenant, creep.

A lilac spray still blossom-clad,
Sways slow before the empty rooms;
Beside the roofless porch a sad
Pathetic red rose blooms.

(mould=mold) His tack, in mould and dust of drouth,
(drouth=drought) On floor and hearth the squirrel leaves,
And in the fireless chimney's mouth
His web the spider weaves.

The leaning barn, about to fall,
(husking eves= Resounds no more of husking eves;
parties) No cattle low in yard or stall,
No thresher beats his sheaves.

So sad, so drear! It seems almost
Some haunting Presence makes it sign;
(spectral= That down yon shadowy lane some ghost
ghostly) Might drive his spectral kine!
(kine=cattle)
(lorn=forlorn) O home so desolate and lorn!
Did all thy memories die with thee?
(roof-tree= Were any wed, were any born,
ridge pole) Beneath this low roof-tree?

Whose axe the wall of forest broke,
And let the waiting sunshine through?
What good wife sent the earliest smoke
Up the great chimney flue?

Did rustic lovers hither come?
Did maidens, swaying back and forth

| | |
|---|---|
| (wheel=spinning | In rhythmic grace, at wheel and loom, |
| wheel) | Make light their toil and mirth? |
| | |
| | Did child feet patter on the stair? |
| | Did boyhood frolic in the snow? |
| (elbow chair= | Did gray age in her elbow chair, |
| armchair) | Knit, rocking to and fro? |
| | |
| | The murmuring brook, the sighing breeze, |
| | The pine's slow whisper, cannot tell; |
| | Low mounds between the hemlock trees |
| | Keep the home secrets well. |
| | |
| | Cease, mother-land to fondly boast |
| | Of sons far off who strive and thrive, |
| | Forgetful that each swarming host |
| | Must leave an emptier hive! |
| | |
| | O wanderers from ancestral soil, |
| (chaffering = | Leave noisome mill and chaffering store; |
| haggling) | Gird up your loins for sturdier toil, |
| (gird up=protect) | And build the home once more! |
| (loins=waist | |
| region) | Come back to bayberry-scented slopes, |
| | And fragrant fern, and groundnut vine; |
| (hold=walled in | Breathe airs blown over hold and copse |
| area) | Sweet with black birch and pine. |
| (copse=woods) | |
| | What matter if the gains are small |
| | That life's essential wants supply? |
| | Your homestead's title gives you all |
| | That idle wealth can buy. |
| | |
| | All that the many-dollared crave, |
| ('Change'=stock | The brick-walled salves of 'Change' and mart, |
| exchange) | Lawns, trees, fresh air, and flowers, you have, |
| (mart=market | More dear for lack of art. |
| place) | |
| | Your own sole masters, freedom-willed, |
| | With none to bid you go or stay, |
| (till=cultivate) | Till the old fields your fathers tilled, |
| | As manly men as they! |
| | |
| | With skill that spares your toiling hands, |
| | And chemic acid that science brings, |
| | Reclaim the waste and outworn lands, |
| | And reign thereon as kings! |

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# Waterwheels and Lumbermen: New England Energy Resources

## Overview

Energy conservation is one of society's chief concerns and alternative energy technology is challenging our best minds. But finding energy is hardly a new problem. On almost any swift stream in New England can be found the old foundations of water-driven mills or the remains of their dams. Producing energy from water and wood dominated the technological activity of New England from the middle of the 19th century until the early part of the 20th century when cheap coal became available. In earlier times, a miller was recruited by nearly every colonial village and the number of mills increased until the mid 1800's when grain production moved into the plains states.

The Dickinson family brought one of the first steam powered saw mills into the area that is now Pisgah State Park. The engine replaced the water wheel, but lumbering continued in much the same fashion along Broad Brook. One source of energy replaced another - a technological change as familiar to a former century as it is to our own.

This unit spotlights one family and its contributions to the business and social life of New Hampshire in the 19th and early 20th centuries. Throughout New England, towns boast libraries, schools, churches, and streets named for just such enterprising industrialists as Ansel Dickinson--men and women who saw the potential in lumber and sought ways to harness energy to turn the raw material into lumber for a burgeoning industrialized society.

Lumbermen had a specialized vocabulary and their mills were built of parts whose names are no longer commonly heard. In the days of "tall trees and tough men" the New England landscape was a different place. Martin Johnson, a specialist in environmental planning, has suggested that 21st century towns in New England may well grow to have a way of life resembling the self reliant style of a century and more ago. Stacks of fire wood in our dooryards attest to the fact that the cost of energy has already begun to change the way we use the land and its resources.

The high cost of fossil fuels makes innovative technology competitive with what, until recently, were our first line energy sources. Water power, once so important to New England industry, is again attractive to individuals and municipalities, this time as a practical source of electricity. Some of the old millwright's terms are creeping back into our vocabulary. We find ourselves again looking at tumbling streams to see what work they can do for us.

## Objectives

1. To help students understand how Pisgah State Park came to be.

2. To help students develop their skills in handling research, selecting material, and presenting a story.

3. To help students learn about lumbering as an industry closely allied to land use.

4. To help students visualize, through mapping, the changes in land use in Pisgah State Park.

5. To help students learn about water-powered mills.

6. To help students estimate the hydro potential of a stream and to encourage their consideration of hydroelectricity.

7. To help students evaluate New England's energy resources.

## Activities

Take your classes along Broad Brook in Pisgah State Park if you can. (Any similar stream that was once crowded with waterwheels and lumbermen will do.) In this area you will see not the old stone walls of abandoned farms, but the stone remains of numerous old mill sites.

We begin this unit with the story of Ansel Dickinson. He provided the economic leadership in the Winchester portion of what was to become Pisgah State Park. In a sense his is an American Horatio Alger story - about the poor farm boy who became a lumber king. As in any story, the selection of data can vary the details considerably. The first activity demonstrates the mutability of a good story as students retell the Dickinson saga with slides and numerous documents.

To study the history of logging, several projects are suggested. One is an excerpt from a fictitious diary of that old Pisgee logger, John Wilton. Another is a list of the lumberman's (decent) vocabulary around which a game can be devised.

We provide a series of maps of the Pisgah State Park area from 1858 to the present. They can be used to depict the changes in land use over the past 120 years. The activity requires imagination. Students will try to visualize which portions of Pisgah were cleared and which were forested at different times. A similar mapping exercise applied to an urban area would show even more dramatic changes than does this rural setting. The mapping exercise could just as well be part of Unit 2, Cemeteries and Cellar Holes.

Hydro-power is a subject that interests many secondary school students. The activity presented here begins with a brief pictorial study of water-driven mills followed by an exercise in measuring the power of a stream as it might be applied to generating electricity. No equipment more sophisticated than a carpenter's level is required and no expertise on the part of teacher or students is called for. A slide show visit to a modern micro-hydro system demonstrates that what was once an energy source can become one again.

To conclude the unit, we suggest that students take a fresh look at the many sources of energy available to us.

# Activity: "Thank You, Capt. Dickinson!"

*(Slides required to carry out this activity are available on loan from:*
*Pisgah Project Coordinator,*
*Environmental Studies Dept.,*
*Antioch/New England Graduate School*
*Roxbury St., Keene, N.H. 03431*
*Tel: (603) 357-3122*

## To the teacher

The title of this activity needs an explanation. Who is or, in this case, was Capt. Dickinson, of what was he a captain, and why does he deserve our gratitude?

Ansel Dickinson (1822-1889) was a lumberman turned entrepreneur. His many business interests in wood products and textiles were derived from his acquisition of large tracts of forest land in the area of Pisgah Mountain and Broad Brook. He made use of the wood and the water to develop further industrial interests along the Ashuelot River from Winchester to Ashuelot, N.H.

The "captain" was more or less an honorary title conferred on men like Dickinson who were important community leaders. Dickinson's many community and political interests were as broad as his economic interests. As a self-made man he took a paternalistic interest in the lives of his employees.

Our gratitude to this man stems from his direct relationship to Pisgah State Park. The lands he acquired so long ago were held intact by his descendants. The state of New Hampshire purchased this land from the Dickinson family and it became the nucleus for the formation of Pisgah Park.

The activity that begins this unit tells the story of the Dickinsons. The class may spend several days in preparation, but the final presentations should be brief. The raw material of their story, how it is selected and presented is up to the class.

(a) Divide class into two groups. Each group receives 40 slides and packets of the Dickinson material.

(b) Each member of the class will read the material provided which includes family anecdotes, excerpts from a will, geneology, newspaper clippings, historical articles, statistics, etc.

(c) Then, the groups, view the 40 slides - all of which are identified and connected in some way with the Dickinson story - portraits, homes, and scenes in Winchester, Ashuelot and Pisgah.

(d) Each group will decide what material in the packet is most appropriate to any 15 of the slides which they select.

(e) The final presentation is a slide show using the 15 slides and a script written by the students. Each slide show should be no more then ten minutes, maximum.

The process of selecting material to tell a story is challenging. The outcome of each group's work is bound to be startlingly different. In the process information about the logging and water power operation in Pisgah Park will have been acquired.

Materials needed for this activity are as follows:

Directions to the students

List of Slides

Selection from History of Cheshire and Sullivan Counties, 1886

Keene Sentinel Article, December 15, 1949

Timber Industry (Cheshire County) 1870

Ansel Dickinson, Business Interests in 1885

Probate Records

Stories from the Family

Articles from the Winchester Star

## Directions to the Students

How do you tell a story? Given facts and pictures how would you select those that you would use in a slide-script show? That will be your task in this activity.

The title of your show is: "Thank you, Captain Dickinson". Your group is to prepare a slide show and an accompanying script for presentation to the class. The show is to be no more than ten minutes long. You can only use 15 slides. Your script may be read or taped, and it must coordinate with the slides.

You will be provided with 40 slides and various documents. You decide what to use to tell your story, "Thank you, Captain Dickinson."

Captain Ansel Dickinson lived during the 19th Century and conducted various logging and milling businesses in the area in or around Pisgah Park. After his death and that of his sons, the land he had acquired was sold to the State of New Hampshire and it became the nucleus for Pisgah State Park. That's all we'll tell you about Captain Dickinson. The rest you will have to find out for yourselves. We have included information, too, about one of Captain Dickinson's business associates - a remarkable woman named Miss Jane Grace Alexander. Will you decide to include her in your telling of the story? What about Captain Dickinson's family? Will they be in your story or will it concentrate on the loggers along Broad Brook? You be the judge of what makes an informative and interesting story.

## Slides

1. Map - Winchester 1877
2. Map - Chesterfield 1877
3. Lower Ashuelot Village - where Broad Brook joins Ashuelot River
4. Ansel Dickinson
5. Mary Theresa Felch Dickinson - Ashuelot, N. H.
6. Dickinson home - Ashuelot, N. H.
7. Felch home - Ashuelot, N. H.
8. LaFell Dickinson
9. Milan Dickinson
10. William Eugene Dickinson
11. John Dickinson
12. LeFell Turbine
13. School - Ashuelot, N. H.
14. Former Methodist Church, Winchester, N. H.
15. Ashuelot Warp Co., Ashuelot River, Ashuelot, N. H.
16. Catholic Church, Ashuelot, N. H.
17. Mill workers' homes - Dickinson Tenant Houses
18. John Dickinson's home - Ashuelot, N. H.
19. LaFell Dickinson's home, Roxbury St., Keene, N. H.
20. Broad Brook Logging
21. Broad Brook - downstream from Lower Dam
22. Well Broad Brook Logging Camp
23. Old Foundation Broad Brook Logging Camp
24. Dam Lower Logging Camp Site
25. Dam Upper Broad Brook Campsite - possible waterwheel
26. Mill Pond - Upper Broad Brook Site
27. Dam Mill Site - Upper Campsite
28. Double Dam Wall - Upper Broad Brook
29. New England Box Company, Winchester, N. H.
30. Jane Grace Alexander
31. Jane Grace Alexander's home - Winchester, N. H. (now Community Center)
32. Jane Grace Alexander's Strawberry Fields
33. Dam and Mill Pond Waterwheel Site
34. Sawdust Soil - Sawmill Site
35. Conant Public Library, Winchester, N. H.
36. Former Railroad Station, Winchester, N. H.
37. Unitarian Church, Winchester, N. H.
38. Winchester Cemetery - Felch, Jennings, Dickinson Tombs
39. Jennings Tomb
40. Dickinson Tomb

### Selection From

# History of Cheshire and Sullivan Counties, 1886

Ansel Dickinson was born in Swanzey February 22, 1822. His boyhood was spent on the farm, where his life was not unlike that of other boys of this period in the history of New Hampshire. His educational advantages were such as were afforded by the common schools of that time, but by close attention to his studies he made progress much beyond the average. Showing considerable capacity for business he came to Winchester and was associated with his brother, General Erastus, at the age of seventeen. Ansel was twice married - first, in 1852, to Jane L. Boleyn, of Hinsdale, N.H., who died shortly after marriage; second, to Mary Theresa Felch, from which latter union there have been born LaFell, Milan A., John H. and William Eugene.

Captain Dickinson has acquired large business experience, and is engaged in a great number of business enterprises in his town and vicinity, and furnishes employment to a large number of wormen, each one of whom has the most implicit faith in his word and entire confidence in his business judgment. In politics Captain Dickinson is a Democrat. In religion a Methodist. For many years he has been a director in the Winchester National Bank, and is also president of the Security Savings Bank, of Winchester. He has represented the town of Winchester (which is largely Republican) four terms in the General Court, has been a member of the School Board, and is sure to be found as an active participant in labors of love for the good of the many. Such a life, earnest, vigorous, true, successful, has a value not to be easily measured, but sure to make the world better and faith in man more firm.

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## from the Keene Sentinel

Thursday, December 15, 1949

### ANSEL DICKINSON WAS IMPORTANT TO WINCHESTER

By Alice D. Matthews

One of the most important men of his time in Winchester was Ansel Dickinson, lumberman, farmer, politician and good citizen.

He was born Feb. 22, 1822, the son of William and Lucinda (Gardner) Dickinson of Swanzey, who lived just over the line from Keene on Winchester street where the Monadnock View farm is now located.

His schooling was scanty and where he could have attended school is a question as there was none near his home.

William Dickinson died when Ansel was but a young lad and went to live with his older brother Nathaniel who lived on the Base Hill road.

At the age of 17 he went to live with his oldest brother Gen. Erastus Dickinson who was then running two sawmills one on Broad brook and one near Mt. Pisgah. The Pisgah reservoir covers the old dam which may be seen at low water.

This tract of timber on Mt. Pisgah was one of the last primeval forests in this section with many of the tall pines marked with the King's arrow designating them as "fit for the King's navy."

Erastus Dickinson, generally called General because of his position in the military company, had acquired this tract several years before. It is still Dickinson property and has been in the family for about 125 years. He put in the first circular sawmill in New Hampshire on Mt. Pisgah.

The clerk of this company was Elbridge Gary Whitcomb, father of J. Fred Whitcomb, the clothier, of Frank H. Whitcomb, long time City clerk and of Edward E. Whitcomb, father of Paul E. Whitcomb of the Cheshire County Savings Bank.

For many years Ansel Dickinson's sons searched for the original plan by Sturtevant, of the Mt. Pisgah area, showing his survey of it.

One day LaFell Dickinson was in the store of J. Fred Whitcomb. Mr. Whitcomb mentioned the fact that an old plan was in his safe and brought it out. Sure enough it was the long-looked-for plan.

When Ansel Dickinson went to Winchester in 1848 to work for his brother in the saw-mills oxen were used for the purpose of snaking the logs about and drawing them to the mill. This was before horses were so used and was the custom all around.

About this time the water-mill on Broad brook was changed to a steam-mill, one of the first in the state.

After working for his brother for a while, Ansel bought and ran a sawmill on the site of the present Fiske Paper mill in Hinsdale.

Later he rented, then bought, the land, the buildings and the water rights in Lower Ashuelot then owned by John H. Fuller for whom Fuller Park in Keene is named. These buildings stood on the same spot as do those of the Robinson Paper mill, now owned by Clarence O'Neal.

Ansel Dickinson started a sawmill there, but as there were two floors to the building he decided to start a boxshop on the second floor with Herschel Fowler of Chesterfield factory, as manager. At one time all the Fowler family worked there, even though the father was the Rev. Thomas L. Fowler, a Methodist minister.

Mr. Dickinson soon allied himself with men in the running of other companies, some of which made pails and tubs. Charles Norwood was one. The show was located where the New England Box company buildings are now in Winchester.

At the time of the building of the Manchester and Keene railroad through Marlboro and Harrisville to Wilton, the lumber used in building the trestles for it were furnished by Ansel Dickinson. There were three or four of these trestles, one of them being about 80 feet from the ground to the rails.

Native workers began to be scarce and so the Irish were helped to come to America to do the work in the shops of New England. Ansel Dickinson was one of those who assisted men to send for their families to come over here.

The first mill workers were those native born, second came the Irish, then the French Canadians, the Italians and the Poles.

Mr. Dickinson was much interested in the making of textiles, as the Colony, Dickinson and company used to make horse blankets and the Ashuelot Warp company made cotton warp, later to be filled in by the other companies with wool, shoddy or otherwise.

While he was living in Hinsdale Ansel Dickinson married Jane L. Boleyn of that town in 1852. She died soon after marriage.

His second wife was Teresa Felch, whom he married about 1867. There were five children from this union, four of whom lived to grow up. LaFell, who lives in Keene, Milan who died a few years ago, John who lives in Ashuelot and Eugene who lives in Greenfield, Mass.

The home of the Dickinsons was in Ashuelot, and here the boys grew up, threatening, sometimes, to tear the house down. When his wife protested about it he remarked, "If they tear it down we can build another one."

"Lumber King" was a term conferred on Ansel Dickinson, who was familiarly known as captain. He was "shrewd, careful, clear-headed and strictly honest." "A benevolent, tender-hearted, public spirited man." "A prince among men."

The care he manifested towards his workers showed itself in many ways and it is interesting to note that most of them looked to him for guidance in voting.

At election times he always came to vote followed by all the men in his mills. They all voted the Democrat ticket as Ansel was a staunch Jeffersonian Democrat.

He gave the land for the building of the Roman Catholic church in Ashuelot. For this he was given a gold-headed cane bearing this inscription, "Presented to Capt. A. Dickinson by Friends in Ashuelot."

He was a tall man, being over six feet in height, broad shouldered and of wide girth. His sense of humor allowed him to give a birthday ball nearly every year to which all his workers and some of the townspeople were invited. As this fell on Washington's birthday, it was a gala occasion. At twelve midnight, a bountiful turkey supper was served at the boarding house to which all were invited.

He served his town as representative four times. His opinions were decided. At the election of Grover Cleveland in 1884, he headed a delegation to the festivities in Keene, all coming in a special train of 14 cars.

Ansel, "Capt." Dickinson, died July 31, 1889 mourned by all who knew him. About 500 persons attended the funeral which was conducted by Rev. Edward A. Renouf of Keene, who commented:- "He was a prince among men."

# Timber Industry (Cheshire County) 1870

| Town | Number of Mills | Capital | Hands Employed | Annual Payroll | Clap-boards | Shingles & Laths | Boards & Dimension Timber | Value of Production |
|---|---|---|---|---|---|---|---|---|
| | | | | | Lumber Sawed | | | |
| Alstead | 2 | $13,000 | 8 | $ 4,000 | --- | 400,000 | 750,000 | $11,000 |
| Chesterfield | 5 | 14,000 | 10 | 4,000 | --- | ------- | 943,000 | 15,000 |
| Dublin | 2 | 5,000 | 7 | 3,000 | --- | ------- | 800,000 | 10,000 |
| Fitzwilliam | 10 | 20,000 | 34 | 13,000 | --- | ------- | 3,200,000 | 60,000 |
| Gilsum | 2 | 3,000 | 3 | 1,000 | --- | ------- | 600,000 | 7,000 |
| Harrisville | 2 | 13,000 | 14 | 6,000 | --- | ------- | 1,500,000 | 28,000 |
| Jaffrey | 5 | 20,000 | 16 | 6,000 | -- | 100,000 | 2,300,000 | 42,000 |
| Keene | 6 | 24,000 | 13 | 6,000 | --- | 450,000 | 1,100,000 | 21,000 |
| Marlborough | 2 | 3,000 | 3 | 1,000 | --- | ------- | 280,000 | 4,000 |
| Marlow | 6 | 9,000 | 12 | 3,000 | --- | ------- | 800,000 | 10,000 |
| Nelson | 2 | 4,000 | 7 | 1,000 | --- | ------- | 300,000 | 5,000 |
| Rindge | 7 | 31,000 | 29 | 8,000 | --- | ------- | 280,000 | 4,300 |
| Roxbury | 1 | 500 | 1 | 100 | --- | ------- | 125,000 | 2,000 |
| Richmond | 13 | 30,000 | 72 | 1,600 | --- | * | 1,600,000 | 46,000 |
| Stoddard | 3 | 6,000 | 5 | 2,000 | --- | 30,000 | 700,000 | 1,300 |
| Sullivan | 5 | 9,000 | 8 | 2,000 | --- | ------- | 600,000 | 8,000 |
| Surry | 2 | 4,000 | 4 | 2,000 | --- | 140,000 | 550,000 | 10,000 |
| Swanzey | 3 | 12,000 | 4 | 2,000 | --- | ------- | 375,000 | 5,000 |
| Troy | 1 | 1,000 | 3 | 1,000 | --- | ------- | 300,000 | 5,000 |
| Walpole | 2 | 8,000 | 8 | 4,000 | --- | 220,000 | 1,100,000 | 30,000 |
| Westmoreland | 4 | 4,000 | 5 | 2,000 | --- | 200,000 | 530,000 | 9,000 |
| Winchester | 6 | 40,000 | 45 | 17,000 | + | 500,000 | 2,425 | 13,000 |

*200,000 beading, 440,000 staves & 75,000 pail stuff

+large quantities of trunnels are manufactured

# Ansel Dickinson, Business Interests in 1885

Lower Ashuelot - lumber mill of A.D.
Security Savings Bank Chartered 1881
1885 - 110,000
Miss J. Grace Alexander, treasurer

Ashuelot Warp Co.
Manufactured cotton warp
ran 3,400 spindles - employed 50

Dickinson & Seaver
pails and buckets
Winchester founded 1883
steam power - 35 people

Dickinson & Baker Winchester
dimension lumber - 20 men

Capt. Ansel Dickinson Lumber Mills at L.A.
dimension
25 men - r.r. through plant

Broad Brook Steam & Lumber Mills on Broad Brook
- with Erastus
dimension lath shingles - 35 men
R. R. ties

Also C. M. Norwood & Co.?

5000 acres and house on Main Street

## Probate Records

When Ansel Dickinson died in 1889 he left no will so his assets and liabilities had to be inventoried. All these records are in the Cheshire County Court House.

Among the interesting assets in his inventory are the following:

| | |
|---|---|
| Real estate - 88 tracts of land | 94,375.00 |
| 7 pr. working oxen | 850.00 |
| 2 - 2 horse teams | 325.00 |
| 2 cows | 50.00 |
| 2 driving horses | ? |

Personal

| | |
|---|---|
| Cash | 1,508.00 |
| Stock in trade | 37,956.00 |
| Stock in bank notes | 78,863.00 |
| Livestock | 1,350.00 |
| Provisions & produce | 1,446.00 |
| Farming utensils | 5,590.00 |
| Household furniture | 450.00 |
| Miscellaneous | 50.00 |

Tenements

| | | |
|---|---|---|
| Thomas Manley owes | 10 days | 2.33 |
| Fred Ella | 19 days | 2.56 |
| Frank Giving | 4 months | 12.50 |
| H. E. Johndreu | | 8.31 |
| Peter Tarder | | 5.00 |
| Henry Ballou | | 9.00 |
| Vesta Fisher | | 4.76 |

## Stories From the Dickinson Family and Others

from a grandson of Ansel Dickinson

> "The only story I know of Ansel is about his size. Dad used to tell of the extremely large build of Ansel, particularly for that time--well over six feet and so broad in the shoulders he needed to turn sideways to pass through a door."

from a Winchester tradition

> "When Ansel left his home in Swanzey to join his brother, Erastus, in Winchester he was so poor and hungry that he was tempted to steal eggs from chickens."

Ansel Dickinson's first marriage at age 30 ended with his wife's death. His second marriage to Mary Theresa Felch linked the Dickinsons to one of the early families of Winchester. Her grandfather was the Rev. John Felch, the first Methodist minister of Winchester.

Ansel teased his wife about being part Indian. She did not like this. (The family knows of no Indian parentage.)

Mary Theresa was considered stern and straight laced but she was left with much of the care of their four sons because Ansel was involved in so many activities.

When their first son was born he was named LaFell. This name was selected by his father because he had just purchased a new turbine for his lumbering operations from the James Lefel Co. (This turbine is still kept by the daughter of LaFell Dickinson.)

Ansel, Mary Theresa, and their sons lived in Lower Ashuelot near the mouth of Broad Brook. They maintained a working farm as well as the lumbering and manufacturing interests.

Ansel Dickinson was a -

- Democrat
- Methodist - attended the Methodist Church in Winchester
- Served 4 terms in the New Hampshire General Court
- a member of the School Board
- a benefactor of the churches, he gave the land for the Catholic Church in Ashuelot
- a director of the Winchester National Bank
- President of the Security Savings Bank of Winchester
- "an active participant in labors of love for the good of many"

Erastus Dickinson who was Ansel's older brother was always called Captain Dickinson because of his military pursuits. He rose to the rank of Major General of the

Volunteers. Ansel was also called Captain for the same reason. Neither brother saw active service.

One of the Keene businessmen told this tory about Ansel: "I remember seeing Ansel Dickinson get off the train in Keene, make the rounds of the banks to obtain loans to buy timber. His last stop was the Keene National Bank. The loans would be paid off and another piece of timber land would be bought."

From a Winchester Old Timer
Ansel Dickinson built the Reservoir in 1844-5 to control the supply of water to the mills. A "ditch" was built from the Reservoir to Broad Brook. He also sold power to the mills on the Ashuelot River. The gates of the dam at the Reservoir were opened at 4 a.m. and closed at 4 p.m.

The children of Ansel Dickinson and Mary Theresa grew up working in the mills and in the timber land. They had no education beyond local schools in Ashuelot and Winchester. Their names were LaFell, Milan, William Eugene and John.

LaFell (named for the turbine) was always called Dick. When his father died "he had to take over". By this time the sons owned Ansel Dickinson and Sons. They combined their company with, in 1889, two other companies to form New England Box Company. At one time this was the leading wooden box company in America. They had 8 plants, the largest on Island Street in Keene.

LaFell Dickinson was President of New England Box. Company headquarters were in Greenfield where William Eugene lived and worked. He was called W.E.

Milan ran the New England Box Company in Winchester.

Although much of the wood used by New England Box Company came from Pisgah, the company did not own the timberland - the Dickinsons did.

LaFell, like his father, married late in life. He married Lucy Jennings, herself a lumber yard operator (after the death of her father). They served together on the Board of the Winchester National Bank - he was President, she, a member of the board.

The Jennings and Dickinson Cemetary lots in Winchester adjoined so with all these things in common they married - he was 50 and she was 35.

"Dick" said he had to marry Lucy to control the competition.

They went on a cruise to South America before they were married, properly chaperoned by Lucy's mother.

They moved to a house on Roxbury Street in Keene to help out an aunt and stayed. Here Lucy Dickinson entertained Eleanor Roosevelt when she visited Keene. Lucy was President of the American Federation of Women's Clubs.

LaFell was quiet and deaf, said he married Lucy to do his talking. Despite his deafness he could hear very well in the mills which he loved.

John Dickinson did not work in the mills or New England Box. He lived "in splendor" in Ashuelot. He loved to hunt and fish. He once had an orchard in Pisgah. He built a camp on the Reservoir and his "chronies" were also able to build camps on the Dickinson land.

The other brothers had summer cottages on Swanzey Lake. At one time the Homestead Mill in West Swanzey, New Hampshire, was owned by the Dickinsons.

LaFell and Lucy Jennings Dickinson are buried together in their adjoining cemetery plots in Winchester. Ansel and Mary Theresa Felch Dickinson are buried there, too.

When New England Box Company closed the question of the Pisgah land challenged the Dickinson family. It was the idea of one of LaFell's sons-in-law to interest the State of New Hampshire in this great tract of Wilderness -- thus came Pisgah State Park.

Jane Grace Alexander was a descendant of one of the original settlers of Winchester, New Hampshire. For years her father was station master of the railroad station in Winchester.

She never married
always wore her hair up
often wore suits
was a trustee of the Conant Library when it was built
had been a school teacher
an active Unitarian
grew marvelous strawberries behind her home, the boys of Winchester picked them for 5¢ a basket

Jane Grace was always called J. Grace.

She was bookkeeper of the Ansel Dickinson Company.

She was Treasurer of the Security Savings Bank chartered in

1881 of which A.D. was President. She is listed as "the first and only treasurer of a bank in New Hampshire".

Her home is now the Winchester Community Center.

## Articles from the Winchester Star

11/1/95
Kindling wood factory burns ...also blacksmith shop... total ruins...big Dean pump at the steam mill which can throw 1,500 gallons per minute under 80 pounds pressure, soon had four streams on fire...and later two heavy streams from the streamer.
...buildings destroyed were owned by Capt. Dickinson's Sons and were not insured.

11/8/95
It is pretty well settled that the kindling wood factory will be rebuilt right here in Winchester. Miss Julia Broderick has circulated a subscription paper and secured pledges for over $200 toward the purchase of a building lot as a gift to the company. It is proposed to buy the Rixford lot, near the railroad, where a switch can easily be put in.

11/15/95
Ansel Dickinson's Sons have purchased the machinery and fixtures of the Winchester Kindling Wood Co.
Winchester is to have another kindling wood factory, the bill for lumber being already in hands of Mr. Amidon of Richmond. Ansel Dickinson's Sons will build and operate the new factory.

11/22/95
Steam mill building being covered with tin...as protection against fire. New blacksmith shop is completed and the kindling wood factory well underway. The old roads about the mill yard have been raised out of the mud by the addition of several hundred loads of dirt, and the river bank next to the engine room has been newly planked to guard against washout. A little dynamo in the engine wool furnishes light for all departments of this large and steadily increasing plant.

12/20/95
W.L. Rixford et. al. to Elijah W. Baker 20 acres land. Consideration $800. Mr. Baker sold the timber on land to Ansel Dickinson's Sons for $500.

12/27/95
Mrs. W.H. Jennings and daughter Lucy went to Concord and will be absent about one week.

12/27/95
Universalist Church...Sunday School superintendent...Miss J. Grace Alexander.

11/29/95
That line of water pipe has a new leak, and Parker street looks like a prairie dog village.

11/29/95
Reintrenchment is the order of the day, and the salary of Principal Smith, of the High School, has been reduced from $950 to $850 per year.

12/13/95
The new kindling wood factory will start up next Monday, will employ 12 girls and 2 man.

12/13/95
Eastern Star, Electa Chapter #19, relected Miss J. Grace Alexander Worthy Matron.

12/20/95
Teams crossed the Connecticut on the ice four days earlier this year than last.

2/18/96
Supt. Lamson informs us that business is gradually gaining at the steam mill, and in due probably the concern will be running at its upmost capacity in the near future.

2/25/96
The high school and grammar school close on Friday next, for a four weeks' vacation.

2/25/96
Winchester business men are talking about lighting their stores by electricity and if they decide favorably, a small engine and dynamo will be purchased.

3/3/96
Ice broke out the side of Ansel Dickinson's Sons' dye house at West Swanzey Sunday afternoon. The water was four feet deep in the floor of the building.

3/10/96
It was decided (at the town meeting) that no more lots be laid out in Evergreen Cemetery below the Swan and Dickinson lots.

3/24/96
Special School Meeting.
Fines for not attending school to be assessed:
First offense $10.00
Second offense and thereafter $20.00.

4/14/96 (ad)

| | |
|---|---|
| Green wood | $3.75 cord |
| dry | 4.00 |
| blocks | 4.50 |
| prepared for stove | $5.50 |

4/21/96
Three Polish immigrants who landed in New York last week stated that they were engaged to work in Winchester, N.H., and the Emigration Commission decided that, under the contract labor law, they must be returned to Europe. Jan Olszewski went from Winchester to New York Saturday to try and get them through but was unsuccessful. They will be sent back to their native land.

5/12/96
Conant Library...Miss J. Grace Alexander, treasurer.

6/9/96
The STAR is indebted to Miss J. Grace Alexander for a basket of monster strawberries, picked from her vines. The berries will average three inches or more in circumference, and are of a delicious flavor. The prospects are that Miss Alexander will have thirty bushels of berries.

6/16/96
In order to hustle the work of cutting the large quantity of pine logs at the Dickinson steam mill, the sawmill is running day and night, and will be kept hard at it for a month or more.

8/11/96
The steam mill will be shut down for a few days.

8/11/96
A band of gypsies northward bound passed through Winchester Thursday.

9/15/96
Miss J. Grace Alexander favors us with some freshly picked strawberries. If frost does not

interfere with the vines, she will have quite a crop of the delicious fruit. A second crop of strawberries is something out of the ordinary!

1/12/97
Lumber shipments from Winchester average over a carload a day. In December, 24 carloads were sent to Keene alone.

1/19/97
While operating a saw at the steam mill yesterday morning, Henry Norwood received a blow just below his left eye from a stick which flew from the saw with great force. His eye was swelled shut in a short time, but it is thought that the sight will not be injured.

1/19/97
Maurice Partridge, who lost a finger at the steam mill three weeks ago, returned to work yesterday. A sum of money, contributed by his friends at the mill, was presented to him a few days ago.

2/2/97
Dickinson Brothers have a large force of men and teams getting the timber from Mt. Pisgah to the Ashuelot Mill.

2/9/97
Rain and warm weather have about ruined the sleighting, and lumbermen and teamsters are feeling blue.

2/16/97
Roy Plaistridge had one of his feet quite badly hurt in the elevator at the steam mill yesterday.

5/11/97
Wm. L.R. Felch and Eugene Dickinson captured 930 bullheads, or pouts in the Turner pond near Ashuelot, last Wednesday night, which, together with a many more, go to stock Pisgah pond. The fish are from one to two years old, and the Turner pond, which compresses about two acres, literally swims with them. Their capture was accomplished in a novel manner. A hole was bored through the dam at the outlet of the pond, and a barrel placed so as to receive the stream of water and also received the fish. Mr. Felch says that 23 fish ran into the barrel in four minutes. Pisgah was an excellent place to catch pouts years ago, but of late they seem to have become very scarce there. This restocking with fresh blood ought to make good sport there in a few years.

5/11/97
Those who pay over $50 tax in Winchester - Dickinson, Ansel, Sons $1,587.24 largest tax payer in Winchester.

7/13/97
The steam mill was shut down Saturday to make repairs on the brick work of the boiler.

7/27/97
Cliff Lamson, foreman of the kindling factory, was 21 years old last Friday, and the dozen girls employed in the factory, together with a few young men, gave him a surprise visit at his home at Mrs. Dickinson's in the evening. Ice cream, cake, watermelon and lemonade were on the bill of fare, and a handsome Old Fellow's ring, which was found in a birthday cake, was presented to Cliff as a

token of esteem. Finally Capt. Wright and his violin were called in, and a jolly "kitich dance" concluded the festivities of the evening.

8/10/97
Miss J. Grace Alexander and Mrs. Lizzie Dickinson returned last night with smiling faces from their trip to the Weirs.

8/10/97
The little finger of Winfred Perry's left hand was badly mangled in a buzz planer at the steam mill yesterday. Dr. Evans amputated the fingers close to the hand.

9/7/97
Miss Lucy Jennings very pleasantly entertained forty of her young friends at her home last Friday evening. Progressive dominoes was the prevailing game, ten tables being in use. Refreshments were served. The party was given in honor of her 15th birthday, and a number of handsome gifts bore evidence of the esteem in which she is held.

9/28/97
Mrs. J.T. Colony of Keene, is spending a few days with her sister, Mrs. Ansel Dickinson.

Cheshire County Grange Fair...
Working oxen, Dickinson Bros. 4th place $2.

About 400,000 feet of pine lumber is shipped from this station every month.

Miss J. Grace Alexander has been taking a few days' vacation, visiting at Edward Thayer's in Keene.

# Activity: Lumberman's Language

*(Pages will need to be reproduced for student use)*

## Introduction

This activity is a College Bowl style vocabulary game that is intended to give your students a taste of what it was like to be a logger during the late 1800's and early 1900's. The "Journal of John Wilton" is fictitious but is based on information available in several books on logging and interviews with former loggers.

## Procedure

Have students read the excerpt from the "Journal of John Wilton" and speculate on the meanings of the underlined words. If books on logging are available, have your students research these words to find out what they mean. Teachers with dramatic flair might consider impersonating "John Wilton" and tell the story (or other stories), asking students to interpret the language.

To prepare for the vocabulary game students should study the word list and definitions. The language is colorful and should be enjoyable for them to learn. The format for the game is any version of the College Bowl that is appropriate. One format is suggested in the activity, "Nothing Succeeds Like Success" in The Changing Yankee Forest unit, p 29

## Following Through

Interviewing old loggers in your area may uncover more unfamiliar words. Interviewing someone involved in modern logging practices will reveal how the language of this line of work has changed from the turn of the century.

Photo courtesy of Pamela Patenaude Mead

# Journal of John Wilton (ca. 1900)
# A Pisgee Logger

15 December. Snow come down steady all day. The push was in a nasty mood. As I was hitching up the hayburners he says to highball it today. As I weren't already. Must have got the word from the Bull himself. Couldn't find my favorite killing pole and the cooker come out late with the nose bags. Worked with Big Joe O'Leary up on the east side of Round Pond. More schoolmarms in one place than I'd ever seen. Must've been a fire up there some time. Hard place to fell trees. By dark we'd skidded only one load down to the yard. Scaler says to Joe, "Is this all ya got today, Joe?" Now the man didn't mean nothing by it but damned if I didn't want to take him down a peg.

24 December. Cold northeast wind blowing. Sleet coming down. Can't say I felt like leaving the ram pasture. Worked with the big crew up on the east side of Pisgee Mountain cutting pulp. Things was going fine till I leaned on my cant dog too hard and snapped the cussed handle in two. Never seen nothing like it. Damned if the walker didn't come by just before it went, too. Things went from bad to worse when the push sent me up to be the skyhooker. Them logs was all coated with sleet and slippery as a greased pig. Lucky I didn't break my back. Another crew had a brindle chain snap coming off the mountain. Lost the load and almost lost the bulls and hair pounder, too. Went into the cock shop just before supper to get my dole from that ornery inkslinger, Pete Reilly. He says to me, "Today ain't payday" and I says to him "Damned if it ain't. The bull's giving us a Christmas bonus." Just giving me a hard time. Well after mumbling and grumbling he paid me off. Going down to Ashuelot to bend some elbows with the boys at the hotel.

## Lumberman's Language

Barroom - not a saloon, but the bunk room or sleeping room of the lumberjacks

Barroom man - chore boy

Bateau - double ended boat used by rivermen on log drives

Birling - a sporting contest, logrolling on water

Boiler (or sizzler) - a camp cook

Boiling up - washing one's clothes

Boom - a sequence of logs strung together end to end to form a pocket to contain loose logs floating in water

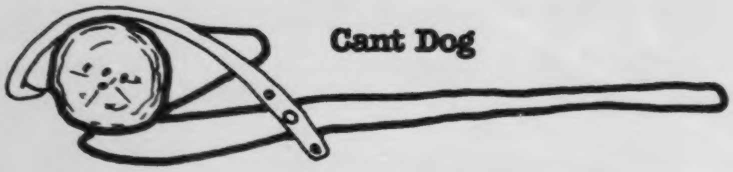
Brindle chain - chain wrapped around a sled runner to act as a brake

Buck - saw a tree into lengths after felling

Bull - boss of logging operation

Bulls - logging oxen

Cant dog - loggers basic tool - stick with a hook on it to move logs



**Cant Dog**

Cock shop - camp office

Cold deck - a pile of logs stored for use later

Cooker - cook's helper

Cord - a stack of wood 4' x 4' x 8'

Cruiser - man who estimates standing timber

Deacon seat - in every bunkhouse, often half a split log, flat side up, runs from one end of bunk house to the other

To drive - send logs down the river

To fall - to cut down a tree

Hair pounder - a horse teamster

Hay burner - a horse

Hay wire - originally literally a wire around a bale of hay. Often used to mend things so became a term for something broken, flimsy or crazy.

High ball - to hurry up production

Inkslinger - time keeper

Kennebecker - any sort of knapsack

Killing pole - a pole that every axeman took into the woods. Used when cutting trees down to push against them to make it fall in the desired direction

Landing - place where logs were brought for loading or rolling into a stream

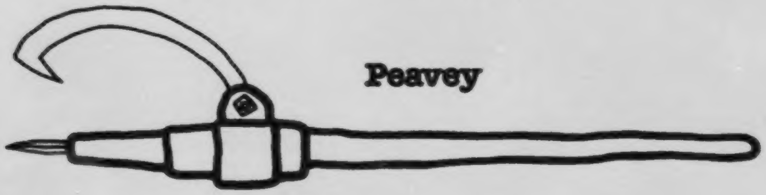
Logger - cuts timber and delivers to mill's log pond

"make her out" - what a logger tells the timekeeper when he wants to quit

Muzzle-loader - old fashioned bunks into which one crawled over the foot of the bed

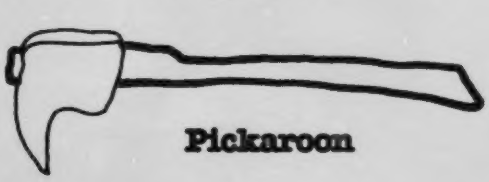
Nose bag - lunch bucket

Peavey - like a cant dog only with a steel pike at one end and an adjustable steel hook. Named after its inventor, Joseph Peavey, a Maine blacksmith



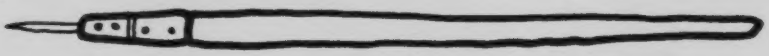
**Peavey**

Picaroon - a tool with a steel hook at the end of a 30 inch handle, used for pulling pulp wood



**Pickaroon**

Pike pole - a long pole with a sharp spike at one end, used for guiding logs in the water



**Pike Pole**

Push - camp foreman

Ram pasture - bunk room, same as a "barroom"

River hog - a river driver

Road monkey - man with the job of keeping a two-sled road clean

Rolled - robbed while drunk

Scaler - a man who determines the content of a log in board feet or in cords

Schoolmarm - a tree with two trunks

Skidding - hauling logs without wheels or runners

Skid row - from "skid road" that is a road over which logs are pulled, then a part of town where loggers congregated, then corrupted to an undesirable part of town

Sky hooker - top man on a sled-loading crew

Slave market - employment market

Turkey - a sack or handkerchief to carry personal possessions

The walker - boss of 2 or more logging camps

Wangon[1], wanigon[2] - Indian origin - refers to the camp outfit, wagons, tents, blankets, etc. - or to camp store

Widowmaker - a hung tree - tree whose top is caught and falls in the wrong direction.

Yarding - assembling of logs

# Activity: Mapping Change in Pisgah

## Procedure

Using historic maps of the park area (p.197) make overhead transparencies. Students can then draw the maps on large pieces of white paper. All maps should be drawn to the same scale. Maps available at this point are of the Park area in 1858, 1877, 1892, 1958 and 1980.

After the general outline of the maps is sketched in students should decide on a key and the symbols and colors to be used in it for each map. Features which need to be represented are such things as homes, farms, mills, schools, roads, foot trails, railroads, lakes, streams, forested areas, open areas. Changes in the amount and distribution of these features should be evident when the maps are completed and compared.

In the case of Pisgah Park imagination based on research will be helpful. Information will be found in Unit II, Cemeteries and Cellar Holes (p.113) and Activity: "Thank you, Captain Dickinson!" (p170).

Colors and areas suggested:

Dark green - woodland
Medium green - openland, farmland
Orange - residential
Red - commercial and industrial
Blue - water, streams, rivers, ponds
Black - roads and boundaries

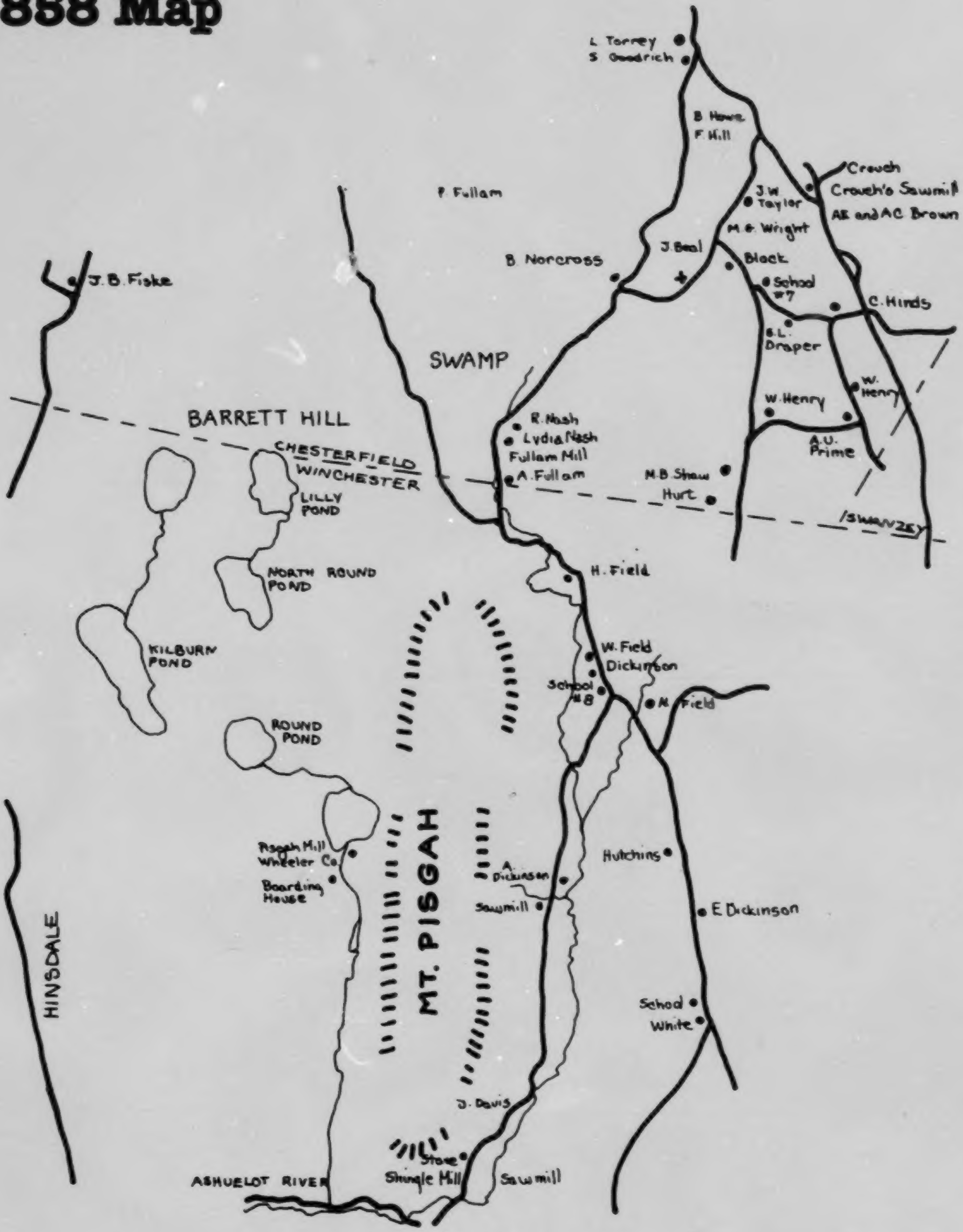
The next step after the maps are completed would be an interpretation by the students of why the changes visible have taken place. Perhaps students could individually write narratives explaining the observed changes, and these could then be discussed as a group and the "best" interpretations chosen to be written up as a formal interpretation of the land use changes in the area.

## Following Through

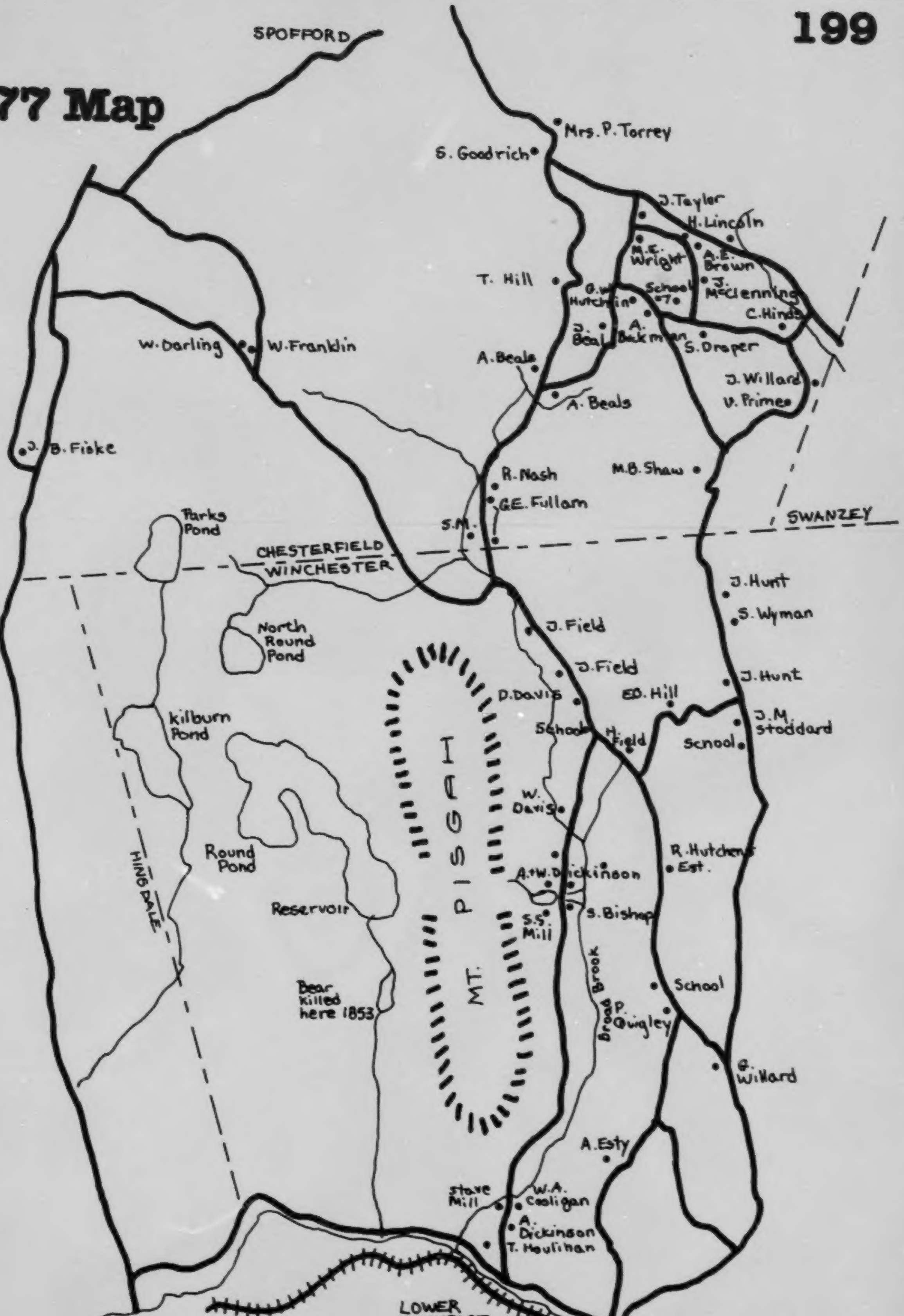
An interesting activity would be to have students make up a map depicting what they think future land use changes in the park might be and to then write a narrative explaining why they think such changes would occur. Several "future" maps could be made to illustrate the several choices of land use available to the park area.

Try this activity with historic maps of a present urban area. The changes in land use are dramatic.

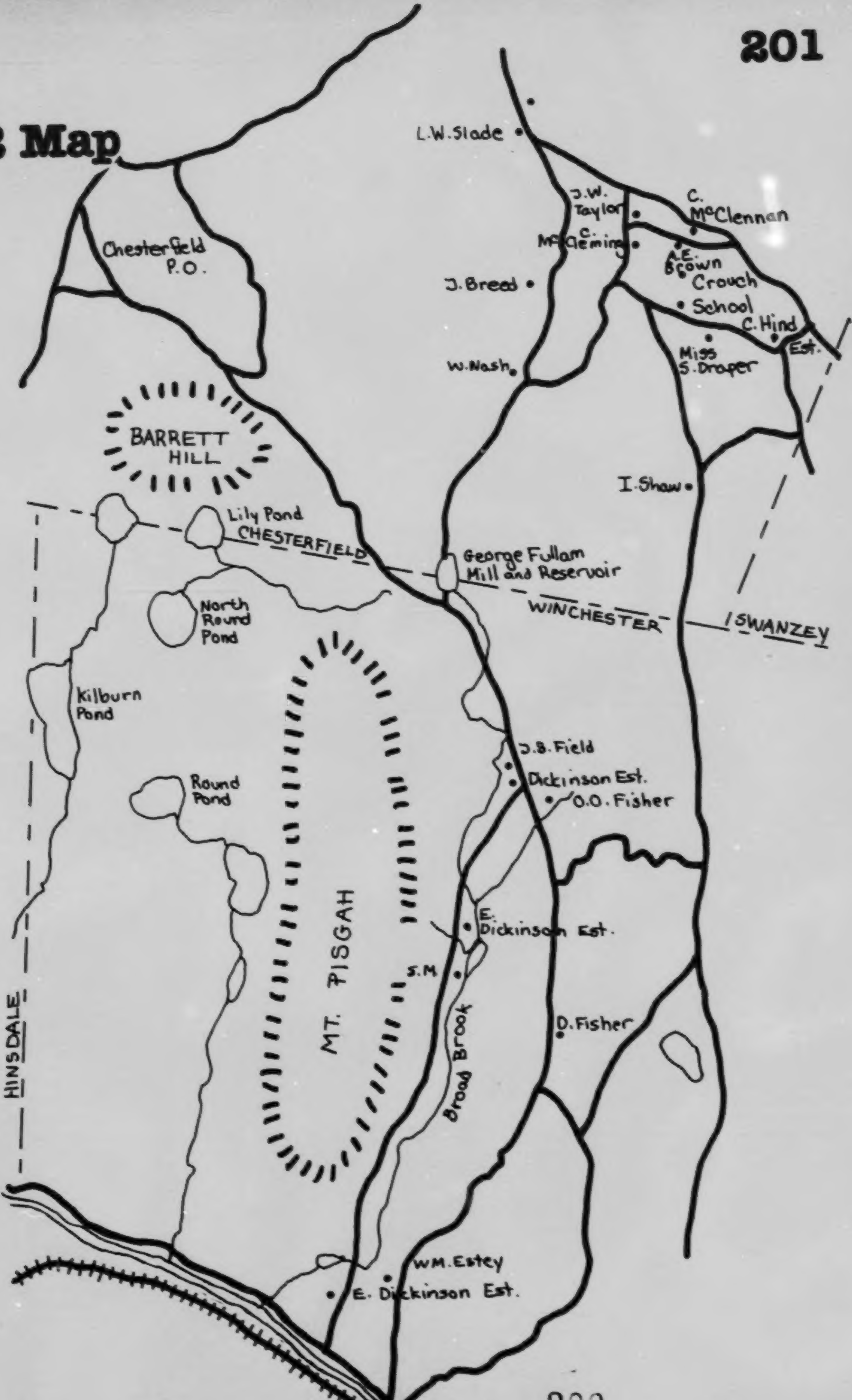
# 1858 Map


L. Torrey
S. Goodrich
B. Howe
F. Hill
P. Fullam
Crouch
Crouch's Sawmill
AE and AC Brown
J.W. Taylor
M.E. Wright
J. Beal
B. Norcross
Black
School #7
C. Hinds
S.L. Draper
J.B. Fiske
SWAMP
W. Henry
W. Henry
A.U. Prime
BARRETT HILL
R. Nash
Lydia Nash
Fullam Mill
A. Fullam
M.B. Shaw
Hurt
CHESTERFIELD
WINCHESTER
SWANZEY
LILLY POND
NORTH ROUND POND
H. Field
KILBURN POND
W. Field
Dickinson
School #8
N. Field
ROUND POND
MT. PISGAH
Pisgah Mill
Wheeler Co.
Boarding House
A. Dickinson
Sawmill
Hutchins
E Dickinson
HINSDALE
School
White
J. Davis
Store
Shingle Mill
Sawmill
ASHUELOT RIVER

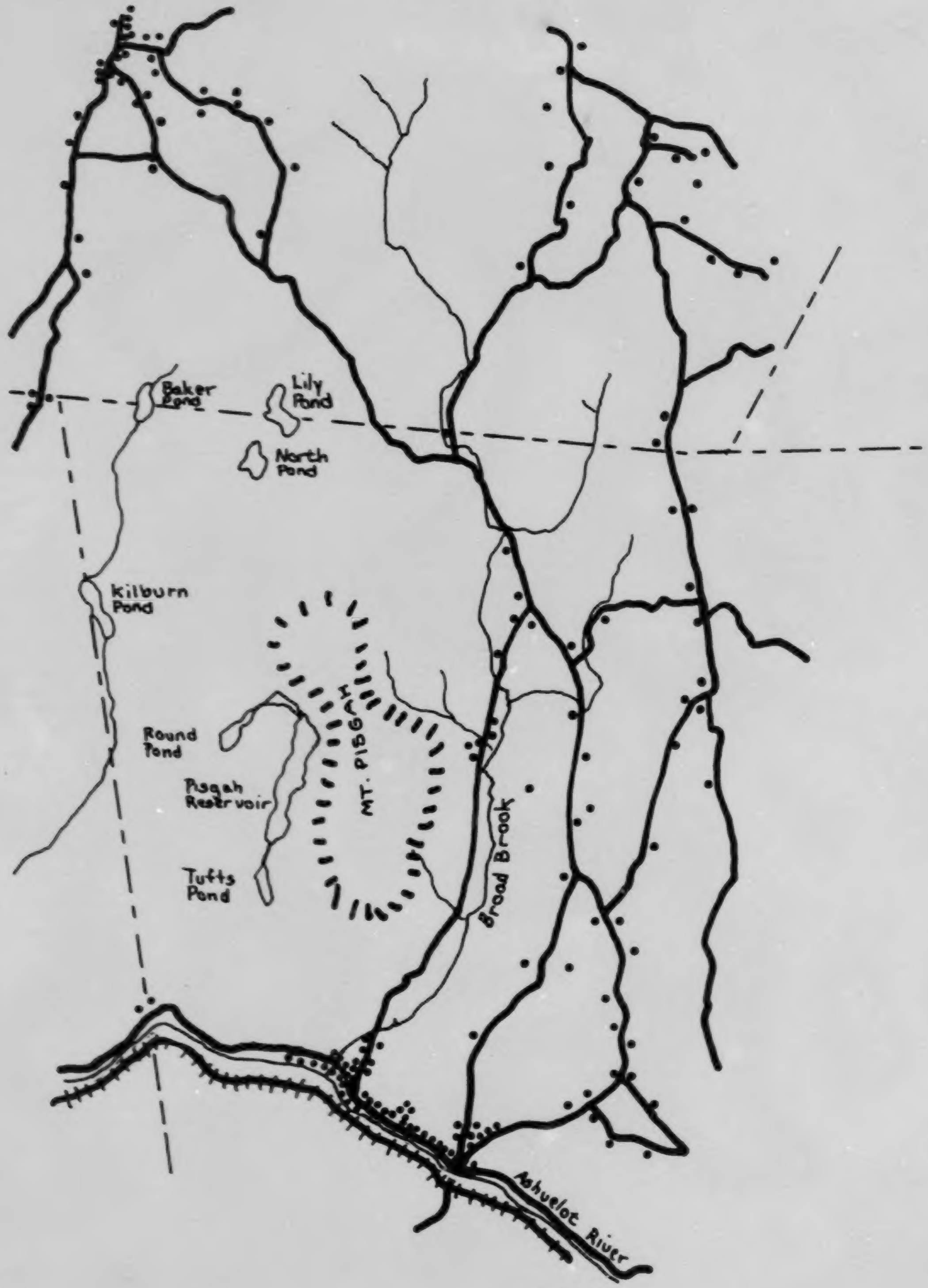
# 1877 Map


SPOFFORD
Mrs. P. Torrey
S. Goodrich
J. Taylor
H. Lincoln
M.E. Wright
A.E. Brown
T. Hill
G.W. Hutchins
School #7
J. McClenning
C. Hinds
J. Beal
A. Beckman
S. Draper
W. Darling
W. Franklin
A. Beals
A. Beals
J. Willard
V. Primes
J. B. Fiske
R. Nash
M.B. Shaw
G.E. Fullam
S.M.
SWANZEY
Parks Pond
CHESTERFIELD
WINCHESTER
J. Hunt
S. Wyman
North Round Pond
J. Field
J. Field
J. Hunt
D. Davis
ED. Hill
J.M. Stoddard
Kilburn Pond
School
H. Field
School
MT. PISGAH
W. Davis
HINSDALE
Round Pond
R. Hutchens Est.
A.+W. Dickinson
Reservoir
S.S. Mill
S. Bishop
Broad Brook
School
Bear killed here 1853
P. Quigley
G. Willard
A. Esty
Stave Mill
W.A. Cooligan
A. Dickinson
T. Houlihan
LOWER ASHUELOT

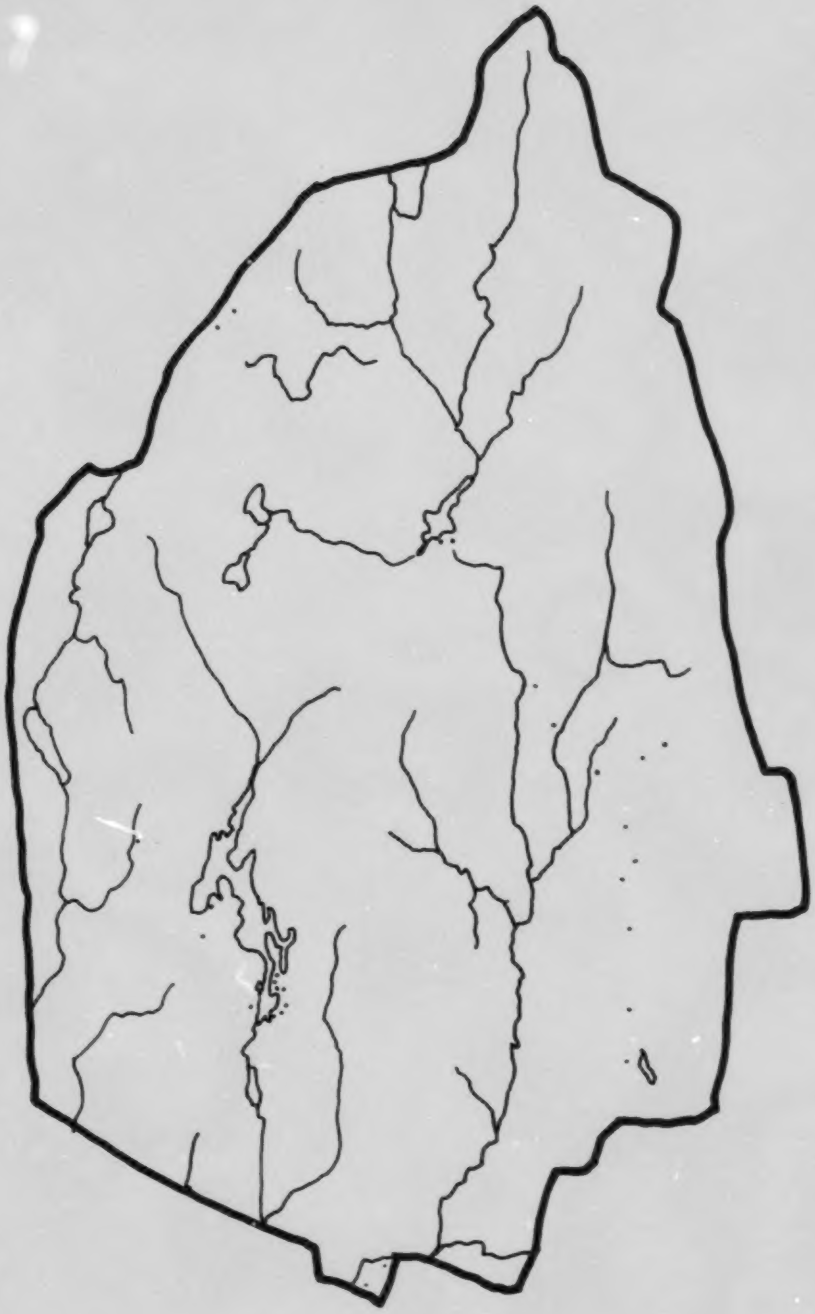
# 1892 Map


L.W. Slade
J.W. Taylor
C. McClennan
C. McCleming
A.E. Brown
Crouch
School
J. Bread
C. Hind Est.
Miss S. Draper
W. Nash
Chesterfield P.O.
BARRETT HILL
I. Shaw
Lily Pond
CHESTERFIELD
George Fullam Mill and Reservoir
WINCHESTER
SWANZEY
North Round Pond
Kilburn Pond
J.B. Field
Dickinson Est.
O.O. Fisher
Round Pond
MT. PISGAH
E. Dickinson Est.
S.M.
Broad Brook
D. Fisher
HINSDALE
WM. Estey
E. Dickinson Est.

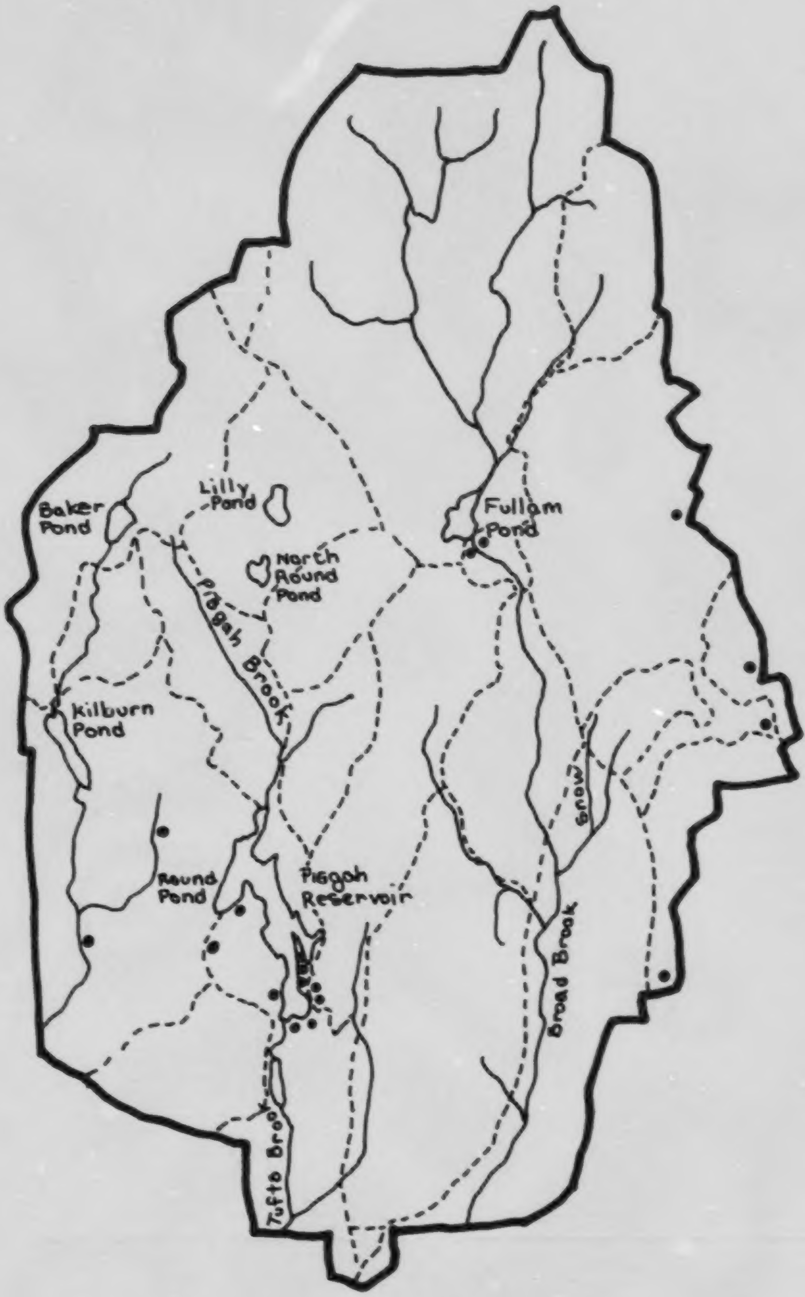
# 1930 Map


Baker Pond
Lily Pond
North Pond
Kilburn Pond
Round Pond
Pisgah Reservoir
Tufts Pond
MT. PISGAH
Broad Brook
Ashuelot River

## 1958 Map



# 1980 Trail Map


Baker Pond
Lilly Pond
North Round Pond
Fullam Pond
Pisgah Brook
Kilburn Pond
Snow
Round Pond
Pisgah Reservoir
Broad Brook
Tufts Brook

# Activity: Yesterday's Waterpower

## Introduction

In the first section of this activity we have provided drawings of a composite mill scene and the principle types of water wheels employed in the eighteenth and nineteenth centuries. The drawings are much more vivid and easily understood than a verbal description.

## Procedure

You will need to reproduce the sheets of drawings, terms, and questions for each student. There is a vocabulary key included for your convenience. The object is to have students name the various external parts of an old mill and to describe the process by which the energy of falling water was put to work to perform the functions of sawing wood, grinding grain, carding wool, and fulling and weaving textiles. To do this the students will probably have to do some research. Some useful books are listed in the bibliography, but there are many others in most school or town libraries.

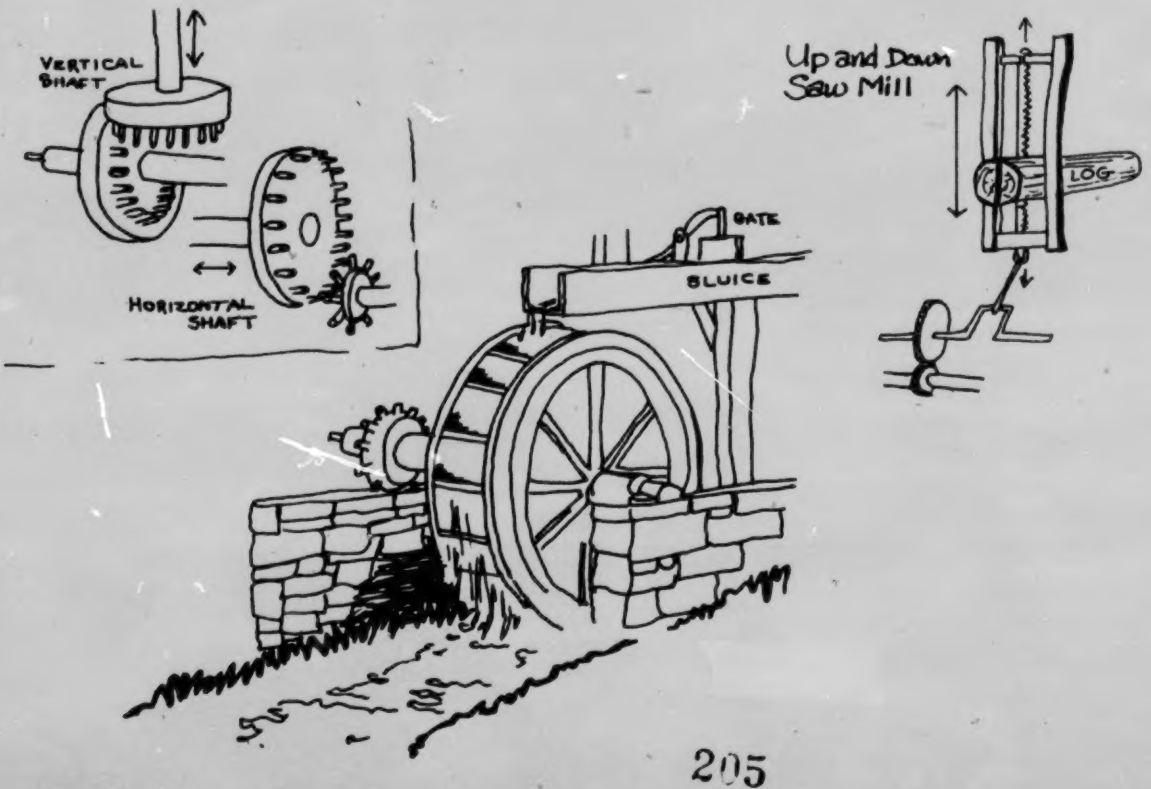
## Following Through

This activity suggests at least two topicsfor research: The history of the changes in water mill technology and an examination of the internal anatomy and workings of grist, saw, and textile mills.

Again the bibliography should prove useful.

## Water Wheels

Water wheels are the traditional technologies used for converting the energy in flowing and falling water into useful mechanical power. They are usually large diameter, slow turning wheels that are most suited to generating mechanical power. This mechanical power can be efficiently used for milling and grinding processes, operating saws, lathes, drill presses and pumps. Or, it can be inefficiently but still effectively used for generating electricity after the rotational shaft speed has been geared up to some suitably higher rpm. Water wheels offer some advantages over higher speed turbines. First, it is quite possible for the individual to construct his/her own water wheel with minimum workshop facilities. Some plans and specifications for water wheel construction are listed in the Bibliography. Water wheels can offer high torque and are thus capable of driving heavy, slow turning mechanical equipment. They will operate in situations of large water flow rate variations and they require minimal maintenance and repair. In addition, trash racks and screens are usually not required, since most water wheels can operate with dirt, stones and leaves entrained with the water. The disadvantages of water wheels are several. They are significantly less efficient than higher speed turbines, they operate at slow speed, and they are bulky. As well, in many areas of North America it is necessary to house them in fairly large structures or otherwise provide some protection to avoid freeze-up if year-round operation is required.



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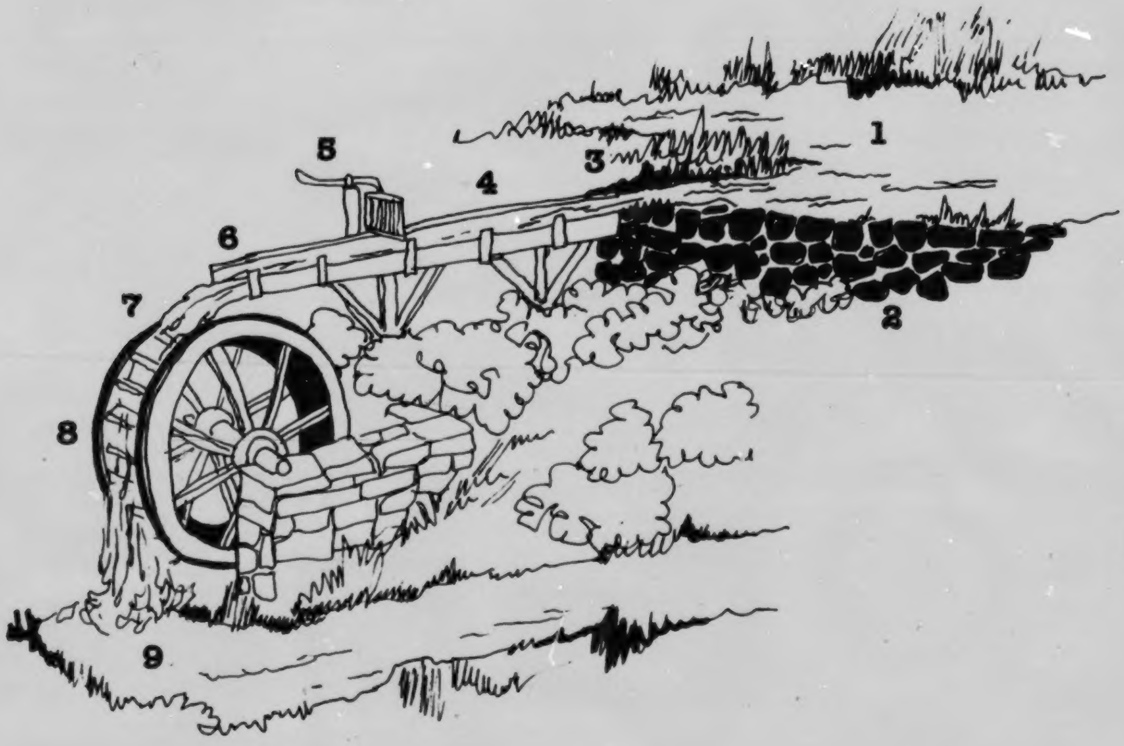
**S**

# Label the Parts of the Mill and Stream



Dam
Stream
Tailrace

Sluicegate
Mill Pond
Head

Millrace
Sluiceway
Overshot Wheel

10. Describe the route of the water in this drawing of a grist mill and how it powers the wheel. Use at least eight mill terms in your description.

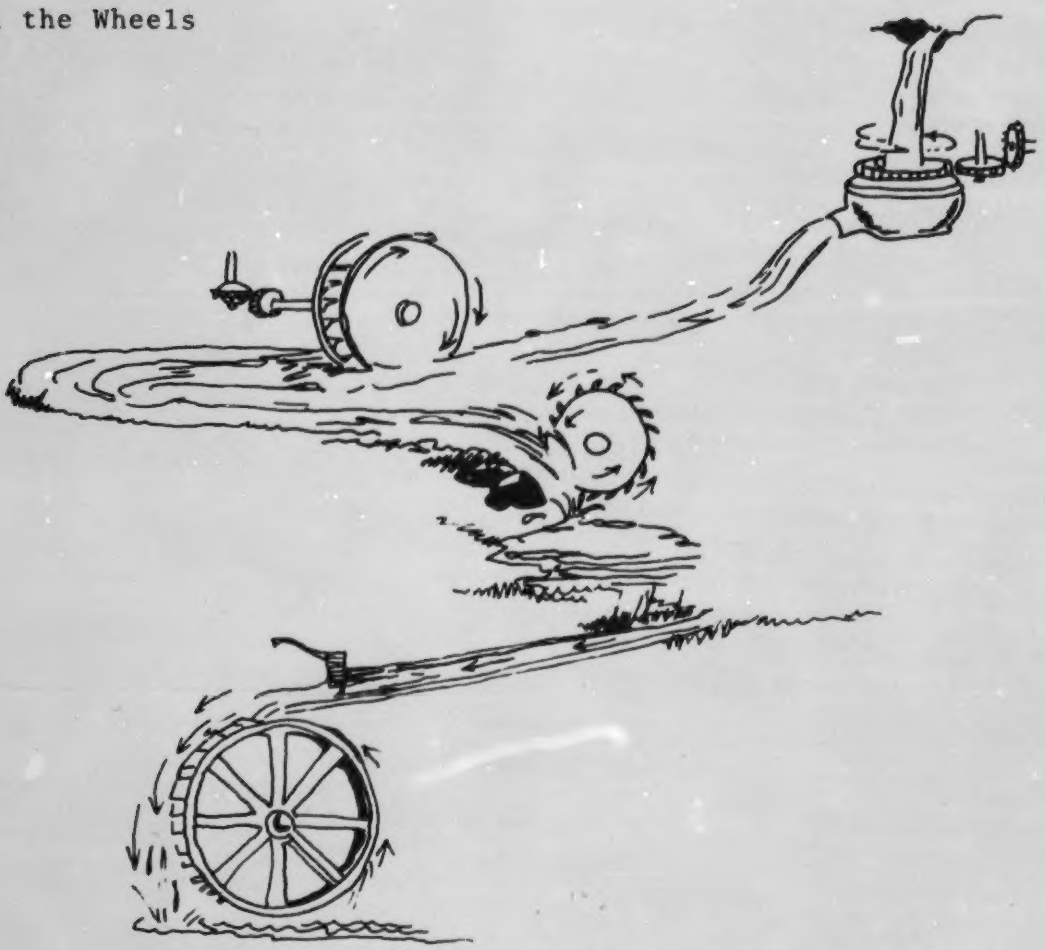
Label the Wheels

11.

12.

13.

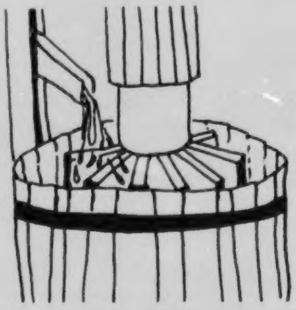
14.



15. Comment on the possible advantages and disadvantages of each type of wheel.

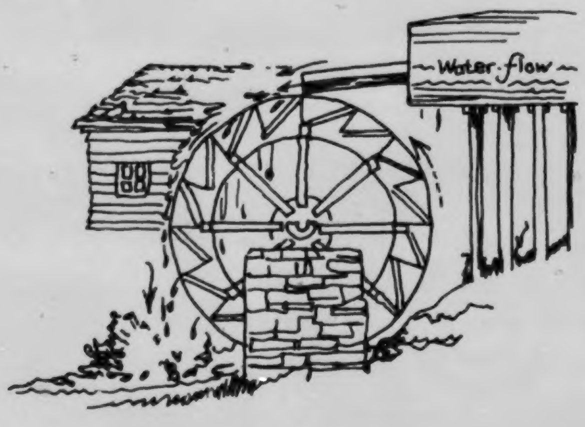
## Tub Wheel:

The simplest of all waterwheels is the tub wheel. The water from the sluiceway enters a horizontally placed barrel. The water falls on wooden or metal blades which cause a vertical shaft to rotate. The water drains out the bottom of the barrel. The advantage of a tub wheel is not just its simple operation but also its ability to be used submerged in running water under ice. A tub wheel requires a continuous flow of water and an eight foot drop. A turbine is a direct descendant of a tub wheel.



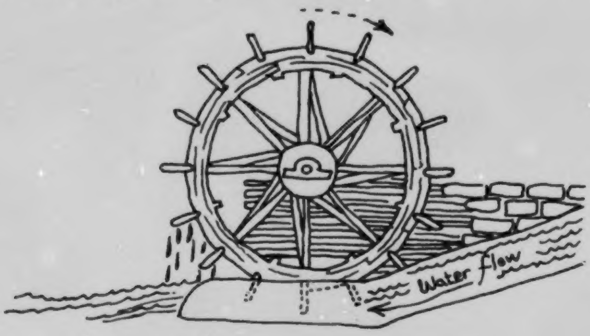
## Overshot Wheel:

Water is supplied by a nearly horizontal chute to the top of the water wheel. The weight of the water in the rim buckets causes the wheel to turn. The entering water usually strikes the buckets with a velocity somewhat greater than the rim speed so as not to be struck by the back of the buckets and be splashed off the wheel. The water supply, and thus the power output, is controlled by a hand-operated sluice gate. Overshot wheels are generally the most efficient of the water wheels. They can operate on any head above 10 feet. Today, the upper limit on the head is around 30 feet because of the cost of constructing a wheel of that diameter.



## Under Shot Wheel:

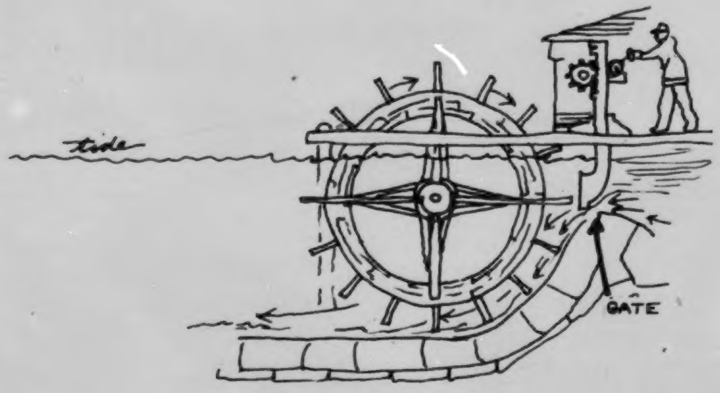
This is the most basic of water wheels. Water passing under the wheel strikes the blades or paddles, causing the wheel to rotate. It can operate on a minimum of one foot of head (producing almost no power at this head), and has a low efficiency. The optimum head range is 6 to 15 feet, with minimum wheel diameter being about 15 feet.



## Breast Wheel:

Water enters the breast wheel below the top of the wheel and is kept in the wheel buckets by a close fitting breastworks until it discharges at or near the lowest point on the wheel. Breast wheels operate best with heads less than 10 feet, and wheel diameters usually range between the head and three times the head. High breast wheels (water entering above the center shaft) have efficiencies that can approach 65%. Low breast wheels (water entering below the center shaft) usually have efficiencies between 35 and 40%.

Breast wheels require somewhat complicated, curved breastworks. In addition, the buckets have to be ventilated to allow air to escape to the next higher bucket as each bucket fills. The close tolerances of the breastworks give the same disadvantages in terms of water-borne debris as for the Poncelet wheel. The complicated construction techniques and the lower efficiencies, particularly in the low breast wheels, usually make other types of water wheels more attractive.



## Millwright's Terms

Continuous flow - refers to the seasonal flow of the water in a stream. The water wheel on a stream which dries up in the summer is not much good.

Head - the distance water falls to the point of impact against a wheel, the percussion stage

Fall - action of water on a wheel/turbine below the point of impact, the gravity stage

Dams, mill ponds - built to preserve a continuous and regulated supply of water to the mill

Mill race - a ditch, a trough or a pipe of earth, wood, iron or cement that conveys the water from the dam to the sluiceway

Sluiceway - small passage through which the water flows before reaching the mill

Sluice gate - gate that opens and closes, regulating the amount of water reaching the wheel or turbine from the sluiceway

Tailrace - the water after it has turned the wheel or turbine

Water rights - legal rights to use the water in a stream

Water wheels:

Tub wheel - a simple horizontal wheel that required little gearing. It did require a long head to work effectively. An ancestor of the turbine

Overshot - a vertical wheel where the weight and percussion of water strikes a series of buckets on the outside of the wheel. Usually very large

Breast - a vertical wheel rotated by the weight and percussion of water striking a series of buckets slightly above or below wheel's axle

Undershot - a vertical wheel rotated by percussion of water striking a series of paddles at the base of the wheel

Turbines - basically a horizontal wheel in a tub but modified to produce great power and efficiency. A vertical shaft with blades (called a runner) is fed water in such a way that it hits the blades in the opposite direction from which they are curved. Produces great power

Grist mill - mill to grind grain. At first used for corn but later for all grains such as wheat

Saw Mill - mill that will saw lumber. Can also be a planing mill to produce smooth boards or a turning mill to produce rounded pieces of wood

Textile mills:

Fulling - process whereby woolen cloth is cleaned, shrunken and felted to give it desired texture. The cloth is literally pounded with wooden hammers while in a water solution

Carding - process in which fibers of wool or cotton are combed, straightened before being spun into yard

Weaving - process in which yarn is crisscrossed (warp and weft threads) to produce cloth

Steam power - replaced water power in mid 19th century. Steam was produced by wood or coal heat. For the time it allowed a reliable power source. It also freed mills from water locations

# Estimating Hydropower: A Field Activity

## Introduction

In any discussion of the energy crisis someone mentions hydropower as an alternative energy source. In this field activity, students will measure the flow of a stream and estimate the potential hydroelectric energy of that flow.

Generating power from falling water is an ancient technology. New England streams were harnessed by early settlers to saw their lumber, grind their grain, press their cider, card their wool, run their looms, and turn their metal and woodworking machines. In recent years hydropower has come to be used almost exclusively for generating electricity. Thirteen of the world's 66 largest hydroelectric generating plants belong to the United States. In addition, about 70 nonfederal hydroelectric plants exist in this country. Throughout the world, falling water is being turned into electric power.

In the 1920's small, private hydroelectric plants generated the electricity for towns and cities all over the country. Many still operate today on the larger rivers. The trend, though, since the 1940's has been away from water power to oil and coal. These fuels were once cheap and using them allowed plants to be located away from rivers. In the 1960's nuclear generating plants began to appear, but by the 1970's serious objections to this method of generating electricity slowed the industry's growth.

Now that oil and coal are no longer cheap fuels and with the public's distrust of the nuclear industry growing, we are once again looking at falling water as an energy resource. What we are considering here is the home hydroplant, a plant capable of making as much electricity as a home, farm, or small business might use. These are called micro-hydro systems.

# Activity: Estimating Hydropower

*Slides of a micro-hydroelectric system operating in Vermont will be loaned to you for use in this activity. Ask for micro-hydroelectric slides from:*

*Pisgah Project Coordinator*
*Antioch/New England Graduate Sch., Environmental Studies Program*
*Roxbury St., Keene, N.H. 03431*
*Tel. (603) 357-3122*

## How to Begin the Activity

Naturally, the way your class approaches this field activity will depend on the topics you have been discussing up to this point. One approach used successfully with a group of ninth graders follows:

1. Ask students to write down on ten pieces of paper, ten items that use some form of power to operate. Request that students use both some everyday and some uncommon items.

2. Arrange the students in small groups of four or five. Ask them to pool their items, eliminating duplications, and than sort the pieces into three piles: those using fossil fuels, those using electricity, and those using mechanical or human power to operate.

3. Have the students now shift as many items as practical to the pile of items that use mechanical or human power.

4. Now ask that the items be rearranged so that as many as practical requiring fossil fuels to operate are shifted to the pile using electricity. Acknowledge that some items (such as trailer trucks) cannot be moved out of the fossil fuel category.

5. Compare the length of the lists within and among groups in the class. Probably the "electrical list" will be as long as or longer than the mechanical list.

6. Provide students with information showing the percentage of electricity generated by different energy sources. The World Almanac is a good source of this data.

7. Discuss the advisability of continued reliance on fossil fuels as a source of electrical energy. If projections of world or national supplies of these fuels are available, use them to direct attention to alternative sources.

8. Depending on your interest or your students' interest in the matter, you may wish to take up the matter of nuclear generated electricity. The following table may stimulate discussion.

9. At present, nuclear power and hydropower are producing about equal amounts of the electricity used in the United States (about 12% each). What are the pros and cons in the argument that these sources of power need to be increased in this country?

10. Suggest that students bring to class a monthly electric bill. Use the information it contains to initiate a discussion of the amount of electricity a typical household needs for a year.

Some terms that need to be made clear:

Volts = this term refers to the strength of the "push" behind the electrons flowing through the circuit. Most household appliances need a push of 115 volts. (A flashlight uses about 3 volts, and an automobile uses 12 volts to start the engine, operate lights, windshield wipers, etc.)

Amps = this term is short for amperes and refers to the size of the stream of electrons flowing through the circuit. In houses, less than 15 amps of electric current flows through appliances.

Watts = this is the most common term used to describe electrical energy. It is equal to the volts times the amps used by a piece of equipment. A 100-watt bulb uses a current of about 0.87 amps pushed by 115 volts.

Kilowatts = we use so many watts in the house that it is more convenient to use a term that means 1000 watts. That's a kilowatt. Ten 100-watt bulbs burning at once would use one kilowatt of electricity.

Kilowatt hours = Since electricity is used all the time, it is flowing through one thing or another at home all the time - this term means kilowatts of electricity used in one hour's time. Ten 100-watt bulbs burning all at once for an hour would use one kilowatt-hour of electricity.

11. Using the accompanying table, Typical Household Appliance Loads, to relate these terms to items your students are familiar with. By dividing the kilowatt-hours shown on an electric bill by the dollar amount of the bill, students can figure out how much the electric company charged per kilowatt-hour. (Alert students to the fact that companies are allowed to add additional amounts to the bill, but that this is regulated by the state.)

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S

# The Market for Nuclear Reactors*

| Year | Nuclear Reactors Ordered by U. S. Utility Companies | Orders for Reactors Cancelled by Utility Companies |
|---|---|---|
| 1970 | 14 | 0 |
| 1971 | 21 | 0 |
| 1972 | 38 | 6 |
| 1973 | 38 | 0 |
| 1974 | 4 | 9** |
| 1975 | 3 | 10 |
| 1976 | 4 | 5 |
| 1977 | 2 | 10 |
| 1978 | 0 | 11 |
| 1979 | 0 | 11 |
| 1980 (thru 3/12) | 0 | 6 |

* Source: U. S. Department of Energy (Data appears in New York Times, March 16, 1980)

** More reactors can be cancelled than ordered in a year because it takes several years to build a reactor.

# Typical Household Appliance Loads

| Appliance | Power (Watts) | Avg. Hours Use/Mo. | Total Power Consump. KW Hr/Mo. |
|---|---|---|---|
| Blender | 600 | 3 | 2 |
| Car Block Heater | 450 | 300 | 135 |
| Clock | 2 | 720 | 1 |
| Clothes Dryer | 4600 | 19 | 87 |
| Coffee Maker | 600-900 | 12 | 7-11 |
| Electric Blanket | 200 | 80 | 16 |
| Fan (kitchen) | 250 | 30 | 8 |
| Freezer (chest, 15 cu ft) | 350 | 240 | 84 |
| Hair Dryer (hand-held) | 400 | 5 | 2 |
| Hi-Fi (tube type) | 115 | 120 | 14 |
| Hi-Fi (solid state) | 30 | 120 | 4 |
| Iron | 1100 | 12 | 13 |
| Light (60-watt) | 60 | 120 | 7 |
| Light (100-watt) | 100 | 90 | 9 |
| Lights (4 extra,75-watt) | 225 | 120 | 27 |
| Light (fluorescent, 4') | 50 | 240 | 12 |
| Mixer | 124 | 6 | 1 |
| Radio (tube type) | 80 | 120 | 10 |
| Radio (solid state) | 50 | 120 | 6 |
| Refrig.(standard,14 cu ft) | 300 | 200 | 60 |
| Refrig.(frost free,14cu ft) | 360 | 500 | 180 |
| Sewing Machine | 100 | 10 | 1 |
| Toaster | 1150 | 4 | 5 |
| TV (black & white) | 255 | 120 | 31 |
| TV (color) | 350 | 120 | 42 |
| Washington Machine | 700 | 12 | 8 |
| Water Heater (40-gal) | 4500 | 87 | 392 |
| Vacuum Cleaner | 750 | 10 | 8 |
| | | | |
| Shop Equipment: | | | |
| Water Pump (½ hp) | 460 | 44 | 20 |
| Shop Drill (¼",1/6hp) | 250 | 2 | .5 |
| Skill Saw (1 hp) | 1000 | 6 | 6 |
| Table Saw (1 hp) | 1000 | 4 | 4 |
| Lathe (½ hp) | 460 | 2 | 1 |

## The Slide Show

The information and discussion of the beginning activity will prepare your students for viewing the slides suggested on p 218 . A script to accompany the slides is included. Your students will now be concerned about the cost of the electricity they are using. How interested they will be when they learn that a few people are making their own electricity using streams near their homes. The set of slides shows just such a micro-hydroelectric system recently put into operation in Southeastern Vermont.

## Slide Set: "A Home Micro-Hydro System"

Slide # 1 Title: A Home Micro-Hydro System

2 About a mile from the nearest house or road the remains of a 19th century sawmill can still be found decaying beside a hillside stream in Vermont.

3 Less than a hundred yards below the old millsite there is a new poured concrete dam. This dam was put in place in 1979, perhaps a hundred years after the mill dam was stoned up.

4 The new dam is at the start of a home micro-hydro system. Water flows through the metal strainer

5 and flows through a 6-inch plastic pipe

6 down to about 225 ft. (we say the system has 225 feet of head.)

7 The water travels 2700 feet altogether before it enters the powerhouse shown here.

8 In the powerhouse the rushing water enters the turbine. (The turbine pictured here is in reality a water pump forced to run in reverse by the water power.)

9 This diagram of a Pelton wheel shows how the turbine works. Water from the turbine flows down the tail race at the right

10 and enters the stream again outside the powerhouse.

11 The turbine is connected to the generator by rubber V-belts. The generator shown here is capable of producing 10 kilowatts of electrical energy...

12 enough to supply all the electricity used by the farm that shows beyond the trees.

13 Meters measure the electricity used to run appliances, provide illumination, and heat the house, greenhouse, workshop and barn.

14 Switches automatically send any extra electricity into a grid supplying other homes, and meters keep track of electricity this system produces that can be sold to the electric company.

15 The modern micro-hydro system has come a long way from the old water wheel. You can see the difference in the following sequence, beginning with the undershot wheel that may have powered the sawmill at the site we saw earlier.

16 Here is overshot wheel. These were considered to be the most efficient and were able to operate on as little as 10 feet of head.

17 If the head is less than 10 feet, a breast wheel was used, but these were more complicated to build than either the undershot or overshot wheels seen previously.

18 A micro-hydro system of the high head variety. High head means the water falls down more than 66 feet from dam to powerhouse.

19 Low head systems (the water drops less than 66 feet) usually uses different turbines than high head systems. (Batteries shown in these diagrams are not used if the excess electricity is sold to a power company.)

20 The electricity required to illuminate and heat this farm as well as power shop equipment is produced by a small stream that runs off a hill behind the house. A micro-hydro system such as used here pays for itself in 10 years or less.

# Measuring the Hydropower Potential of a Stream

## Introduction

Reading through the combination procedure/data sheets accompanying this exercise will make it clear to the teacher what is involved in the exercise.

Teachers who can arrange to take their classes to a stream near their school can measure the potential hydropower in one or two sessions (depending on the size of the stream).

In brief, the exercise involves making field measurements of two factors, the flow rate and the head. The flow rate is the quantity of water flowing past a point in a period of time. Typical flow rates are gallons per minute (gpm) and cubic feet per minute (cfm). The head is the vertical drop of the water from the level of the dam or spring to the level of the turbine. It is measured in feet. Ideally, these measurements should be made in the dry season so that you will know the lowest amount of power the stream can provide, but for teaching purposes the activity can be carried out whenever there is open, flowing water.

The field data is used to make final calculations (see p 231) of kilowatts of power.

There are three ways to measure the flow of a stream.

(a) For small mountain streams or for springs, make a temporary dam and direct all the water into a garbage pail or small barrel of known size. Time the number of seconds it takes to fill this container.

(b) For larger streams, the float method is used. All these activities are based on the float method.

(c) The weir method is a more involved method and is discussed at length in some of the references listed at the end of this unit.

Measuring the head is the most difficult part of this activity to carry out accurately. It takes patience to set up the carpenter's level and it requires a steady hand to hold the rod vertically while the level and bench are being moved and set up. The teacher should work closely with this group.

Calculating the kilowatts of power is not beyond the ability of even slow ninth graders, but for slower groups performing the calculations as a class activity seems to encourage participation. More sophisticated or advanced students should be directed to analyze the sources of error and consider some of the factors used to convert raw data into practical estimates of power.

## Team I. Measuring the depth and width of the stream

You will need: meter stick

1. Use the meter stick or a piece of string to measure from one side of the stream to the other in inches. Choose any convenient working area.
Make 10 measurements and find the average.
Width of stream:______________inches

______________

______________

______________

______________

______________

______________

______________

______________

______________

Add these measurements together and divide your answer by 10.

Average width:

______________ inches

2. Find a place that is about as wide as the average width. Put the meter stick into the stream and measure in inches how deep it is at 5 different places across.
Find the average depth.

Depth of stream:______________inches

______________

______________

______________

______________

Add the 5 depths together and divide the answer by 5.

Average depth:

______________inches

Team:________________________

________________________

________________________

## Team II. Measuring the Rate of Flow

You will need: a long length of twine (10 to 15 meters long)
meter stick
watch with second hand
a block to use as a float.

1. Find a fairly straight section of the stream near where Team I is measuring the width and depth.

2. Use a piece of string to measure off as long a straight stretch as you can find. Try to find a place about 30 feet long.

3. Put a marker -- a rock or a stake -- in the water at the beginning and end of this section and then carefully time the seconds it takes for the block to float from the beginning point to the end.

   Do this 5 times.

   Length of straight section:______________feet

   Time 1:______________sec.

   Time 2:______________sec.

   Time 3:______________sec.

   Time 4:______________sec.

   Time5:______________sec.

Add these times together and divide by 5 to find the average.

Average time______________sec. Divide by 60 to find average minutes.

Average time______________sec. =______________min.
60

4. Find the rate of flow: Divide the length of the section by the average time in minutes. Length :______________feet = rate of flow:____________feet/minute. Avg. Min.__________________

5. If the brook has smooth sides, multiply the rate by 0.85 to find the true rate.

OR

If the brook has rough sides, multiply the rate by 0.60 to find the true rate.

True rate________________ feet/min.

Team:____________________

____________________

____________________

____________________

____________________

## Team III. Surveying the Head

You will need: a level and bench
meter stick
measuring rod

1. The surveyor holds the level on the bench and the rodman measures how far the top of the level is from the top of the water where the dam will be.

   Height of level above water:__________________

2. The rodman holds the measuring rod at some distance down the brook. The surveyor sights over the top of the level and tells the rodman to mark a spot on the rod exactly even with the line of sight. This is point A. The rodman must hold the rod in this position until the next step.

3. Surveyor moves his bench to the rod and sets up. Measure the distance from point A on the rod to the top of the level.

   Distance from Point A to top of level:__________________

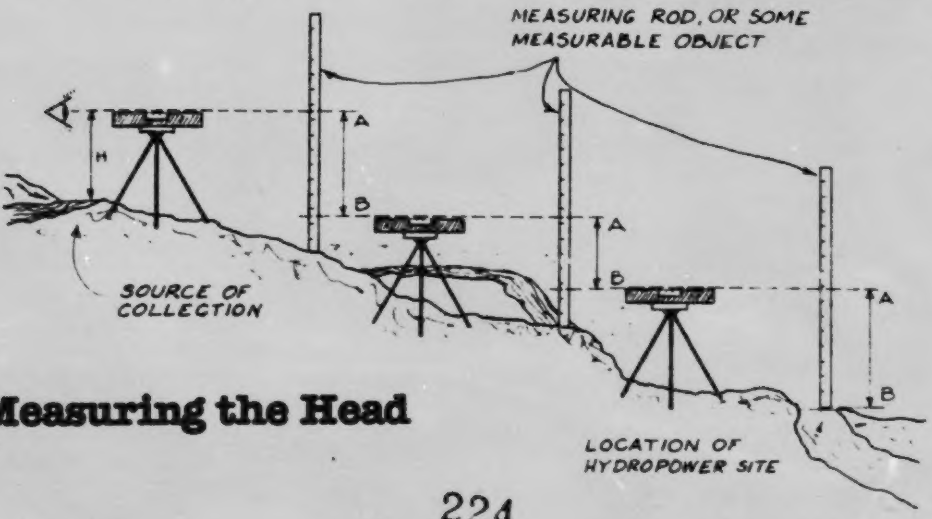
4. Rodman moves along down the stream. The surveyor sights along the level again and tells the rodman where to mark point A on the rod even with his line of sight. (This may not be at the same point A as before.)

5. Surveyor moves to the rod, sets up, and the distance from point A on the rod to the top of the level is measured again.

   Distance from Point A to top of level:____________________

6. Surveyor and rodman keep doing this until the rodman comes to the place where the powerhouse will be built. This last time, measure from point A to the level of the ground.

   Distance from point A to the ground:____________________


MEASURING ROD, OR SOME MEASURABLE OBJECT
H
A
B
A
B
A
B
SOURCE OF COLLECTION
LOCATION OF HYDROPOWER SITE

**Measuring the Head**

230
S

7. Add all the distances from A to the level together. Add the last measurement.

Total of distances measured;________________

Now subtract the height of the level above the water (from Step 1) from the total.

Total distance:______________-Height of level at beginning _____________= Head

Head:______________ feet

Team:___________________Surveyor

___________________Rodman

___________________

___________________

___________________

# Finding How Many Kilowatts a Brook can Produce

I. We need to know the cross-sectional area of the stream.

1. What is the average width?_______________feet

2. What is the average depth?_______________feet

3. Area = width x depth: _______________square feet

II. We need to know the rate of flow.

1. How long is the section of the brook you measured?

_____feet

2. What is the average time for the block to float?

_____seconds

3. Rate = $\frac{\text{feet}}{\text{seconds}}$

4. Multiply by 60 to change the rate to feet per minute:

__________feet/minute

5. Use. 0.85 of the rate if brook sides are smooth. Use 0.60 if sides are rough.

_____ft/min x $\underset{\text{(0.60 to 0.85}}{\underline{\hspace{3cm}}}$ = __________ft/min true rate

III. We need to know the amount of water flowing in the brook.

1. Multiply the area by the true rate.

_____square feet x_____feet/min=_____cubic feet/min.

Decide how much of that volume of water you should use to make electricity.

Multiply the volume by 0.25 to use 1/4; multiply by 0.5 to use 1/2.

_____cubic ft/min x $\underset{\text{fraction of stream}}{\underline{\hspace{4cm}}}$=_____cubic feet/min.

IV. We need to know the power available.

1. What is the head of the stream?__________feet
2. Multiply the volume times the weight of water times the head.

   62.4 lbs/cubic foot x ______ (volume) cubic feet/min x ______ (head) feet = __________foot-pounds/min.
3. How many kilowatts is that?

   Divide the foot-pounds/min. by 709:_____kilowatts

V. Some power will be lost just turning the turbine and generator. Some power will be lost because of friction of the water in the pipe. Engineers usually take about 53% of the estimated power when the figure kilowatts.

_____kilowatts x 0.53 = _____kilowatts

## Activity: Evaluating Power Sources

The activity may have convinced some students that hydro is the way to go in the future. But there are arguments against hydropower, one of the most convincing being the one that hydrodams flood the land. A realistic scenario for hydropower would have to take into consideration the acres of land that would be lost as water deepens and spreads out behind the dams.

Every power technology has its good and bad points. Researching the various ways in which electricity is and can be generated will reveal these positive and negative aspects of power production.

Assign students to work in groups to complete a wall chart with these headings:

| Method of Producing Electrical Power | Principal Energy Source | Estimated Reserves of Energy Source Worldwide | Amount of Electricity Being Produced at this time by this method | Negative Aspects of this method including environmental impact | Positive Aspects of this method including advances in technology |
|---|---|---|---|---|---|

# Bibliography

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Sloane, Eroc. Our Vanishing Landscape. New York: Ballantine Books, 1976.

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## Museums Featuring Materials on Logging

Adirondack Museum, Blue Mountain Lake, New York. The museum includes a whole building devoted to logging in the 1800's and 1900's. Although some of the practices were different in the Adirondacks there is a lot of similarity. There are educational materials on logging. Charles Fonteyn is the contact person 518-352-7311 or 7312.

Farm and Forest Logging Museum, Bethlehem, New Hampshire. Operated by the Society for the Protection of New Hampshire Forests. Ross Fullum is the curator.

Fisher Museum of Forestry, Harvard Forest, Petersham, Massachusetts. Open 9-5 on weekdays. Includes 23 remarkable dioramas on changes in forest use and silvicultural practices. A very graphic overview of forestry.

Fox State Forest, Hillsboro, New Hampshire. In the educational center there is a collection of logging tools. Also a number of old photos on file. Phil Verrier is the contact person 464-3453.

Old Sturbridge Village, Sturbridge, Massachusetts. There are working grist, textile, and saw mills here.

## Records

Ted Ashlaw, Adirondack Woods Singer, (Philo 1022) Philo Records, Inc., The Barn, North Ferrisburg, Vermont 05473. Ted was born in a logging camp in the northern Adirondacks and worked in the woods and the mills for over 30 years. His songs were learned from other woodsmen. Two songs of particular interest are "Miner Hill". and "Driving Saw Logs on the Plover".

## Slides

Harvard Forest Diorama Slides. Ten slides from the Historical Series and Silviculture Series for $3.00. Available from the Fisher Museum of Forestry, Harvard Forest, Petersham, Massachusetts 01366

# Snowmobiles, Skis and Snowshoes: Using the Winter Landscape

## Overview

Snowmobiling, cross-country skiing and snowshoeing, the major winter sports in New England, draw attention to the effect these sports have on the environment generally and on Pisgah State Park in particular.

Pisgah is busiest in the winter. After hunting season and the first good snow has fallen, Pisgah is full of sportspeople. With only one park ranger there is little that can be done to develop the park for broad usage, but a serious attempt has been made to provide trails for snowmobilers and cross-country skiers. These are the uses to which the park is put at present: for hunting and fishing, hiking, and winter sports. Once the land on which the park now sits was used for farming, lumbering, and milling. Now the land has been retired from the work-a-day and hosts the sportspeople of the southwestern New Hampshire area.

Setting aside land for play raises questions, some of which are listed on p285. of the Pisgah Simulation unit. Planning the future use of land includes a study of its terrain, its plants and animals, but additionally land use requires a knowledge of how people use the land at present. What responsibilities must present users assume in order to assure that the land is maintained in a condition favorable to future vital uses? The future use of land is the theme of the final two units of this project.

Ancient societies set aside parks to glorify their rulers or commemorate their gods. Modern societies set aside parks for the recreation of its members. Who can picture a world today without parks? It is the recreational uses of land that we invite you to explore in this unit.

## Objectives

1. To help students in their use of the community for market research and as a resource for opinion gathering.

2. To help students make use of a variety of resource maps to design recreational trails in keeping with the needs of the environment.

3. To increase students' appreciation of other people's recreational interests to encourage a positive relationship among proponents of various winter sports.

4. To help students evaluate conflicting opinions through comparison of quotations pertaining to aspects of winter recreation.

5. To help students learn to identify plants and animals in winter and to relate the presence of organisms to the recreational uses of the land.

6. To help students resolve a moral dilemma through ranking differing moral arguments on the basis of validity.

## Activities

The activities in this unit are designed to foster a regard for all winter sports and for their impact on the environment. While the exercises are based on our knowledge of and experience in Pisgah State Park, the directions can be applied to any winter recreational area. And in any such area the central issue is the same: Is winter recreation compatible with the needs of the land and the life it supports?

The first activity asks students to gather data about the equipment used in various winter sports. It is an activity easily adapted to a range of academic abilities. Not only do students study the various items needed to participate in the sports, but they run straight into questions about the economics of winter recreation.

Where should trails for winter sports be placed? How do the requirements of the sport and the needs of the environment come together in answering this question? Students are asked to lay out winter recreation trails given maps of environmental resources to serve as guides. The activity can be expanded to include the designing of other recreational facilities in real or fictional parks.

Opinions vary on the appropriateness of winter sports, especially as they are carried out in wilderness or undeveloped areas. Some direct quotations have been collected for an exercise in opinion and fact evaluation. The quoted statements probably will generate considerable controversy.

The scientific relationship between winter recreation and plants and animals is perhaps too broad a topic to explore here, but an opportunity to observe some specific ways in which recreation impinges on living things is in order. Several activities are suggested that contribute to accomplishing this aim.

Assessing and evaluating peoples' opinions and attitudes toward winter recreation is another topic too complex to be carried out in detail by high school students, but learning something of the range of feelings and how feelings change can be a profitable experience. To that end, an opinion sampling exercise is included.

Land use issues usually involve a conflict among various moral stances. Recreational use of land is no exception. Because moral dilemmas are useful in helping students clarify their own values and because such dilemmas are a real part of the land use decision making process, one such dilemma is the topic of the concluding activity.

# Activity: Winter Sports Equipment

## Introduction

A study of winter sports has built-in interest to almost any class. This introductory activity takes advantage of this interest by looking at the equipment needed for the sports of snowmobiling, cross-country skiing and snowshoeing. Market research, class presentations and, finally, a valuing exercise are described.

## Part A

To research the equipment needed for winter sports is the first project for the class. The class can be divided into interest groups such as snowmobilers, cross-country skiers, and snowshoers. In addition a group might research winter recreation clothing. Students may suggest other areas of investigation, such as snowmobile fuel and maintenance or ski waxes. Local stores can be counted on to provide the necessary information. Advertising brochures can be obtained from dealers. Students will have personal knowledge to share.

## Part B

The students should decide on how to organize all the collected information. Group reports to the class would be one way. A data sheet for each sport might help as a check on obtaining pertinent information that can be shared by the whole class. Such a data sheet for snowmobiles is included as a sample. It is also suggested that the availability and cost of secondhand equipment be discussed. A bulletin board display of the colorful brochures collected would add to each group's sense of accomplishment. It is essential for each group to learn the information acquired by the other groups.

## Part C

Students are reassigned so that each student is in a group (representing snowmobilers, skiers, or snowshoers), one he or she did not research.

The new group is to list the advantages (only advantages) of that sport. The information about equipment can be used. The lists of advantages will then be presented to the class as a whole, the teacher acting as a facilitator.

The challenge for the class and for the individuals is to seek out the positive aspects of each other's winter sports. Learning something of the unfamiliar sport or defending a sport one does not care for can be worthwhile activities.

## Snowmobiles- Sample Data Table

| Maker | Model Number | Cost New | Engine Type | Max. H.P. | Avg. MPG | Wgt. | Drive Type |
|---|---|---|---|---|---|---|---|
| Yamaha | | | | | | | |
| Arctic Cat | | | | | | | |
| Ski-Doo | | | | | | | |
| John Deere | | | | | | | |
| Spitfire | | | | | | | |
| Kawasaki | | | | | | | |
| Scorpion | | | | | | | |
| Moto-Ski | | | | | | | |

## Activity: Plotting Recreational Trails

### Introduction

Almost everything students and their teachers know about winter sports comes into play in this five-part exercise in plotting trails. More than that, what students and teachers know is challenged in this activity by asking them to think about their sport in relation to the land and the life it supports. Sports techniques, knowledge of equipment, and personal experiences are combined with skills in map reading and facts about plant and animal habitat in order to increase awareness of the impact of recreation on the land. We trust this will lead to more responsible winter sportsmanship.

Pisgah State Park is the model used in this activity and a trip along some parts of its extensive trail network as either an introduction to or a culmination of the work will be beneficial. However, what students learn from the paper and pencil exercises presented here and the discussions they will stimulate can be applied to any local winter recreational area.

## Part A. Snow Depth and Trail Planning

### Procedure

Groups of students are assigned to measure the depth of the snow cover in as many of the following plant communities as are available: hemlock stand, mixed hemlock and hardwood, hardwoods, white pine stands, open field. In general, wintering animals look for areas with shallow snow depth and for protected areas where snow melts earliest.

Measurements should be taken at several locations (depending on overall size of the area) within one community and then averaged for that community. All measurements should be at least 3 meters from major tree trunks. Note evidence of animal activity. Also note the general compass heading of the major slope. Data might be recorded in this fashion:

| Plant Community Type | Direction in which slope faces | Snow Depth Measurements | Average Depth | Evidence of Animal Activity |
|---|---|---|---|---|

The objective is to be able to compare the depths among several plant communities.

### Materials

Meter stick

### Questions for discussion

1. What relationship exists between plant community and snow depth?

2. What relationship exists between snow depth and signs of animal activity?

3. What relationship exists among the direction the slope faces, snow depth, and animal activity?

4. If you were planning a snowmobile trail, through which one of the plant communities would you have it run? On what basis do you make that choice?

5. If you were planning snowshoe or cross-country ski trails, as far as impact on the area is concerned, would you have them run any differently from a snowmobile trail? How do you make that decision?

## Part B. Topography and Trail Planning

### Procedure

Distribute map 1, Simplified Contour Map of Pisgah State Park, and review the meaning of the contour lines and the elevation numbers.

The objective is to use the information contained in a contour map to locate trails used for winter recreation.

### Questions for Discussion

1. What is the meaning of TOPOGRAPHY?

2. What are CONTOUR LINES?

3. If contour lines are close together, what does this tell us about the slope of the land? What does it mean when the contour lines are far apart?

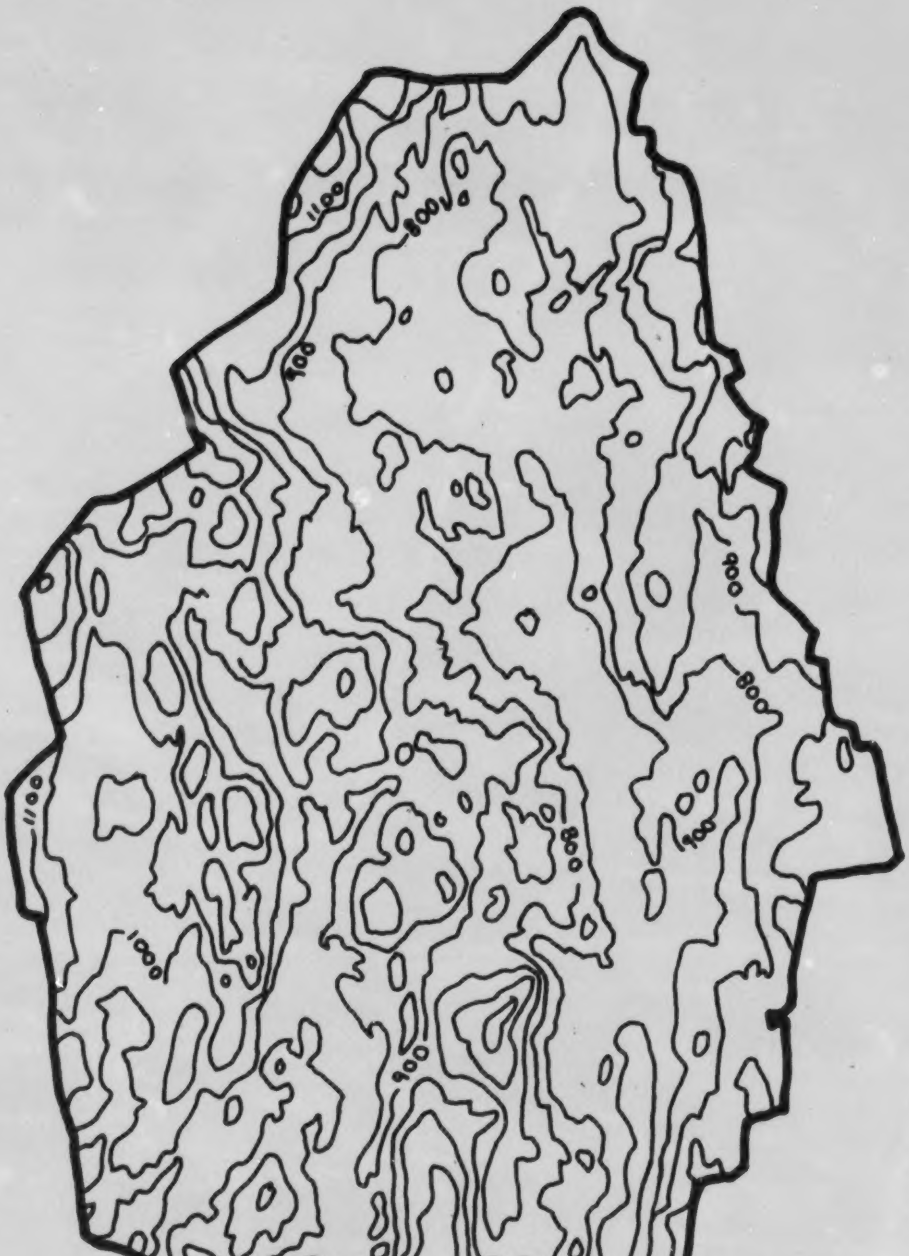
4. What topographic features would make for good snowmobiling?

5. What topography would be best for cross-country skiing? Snowshoeing?

With the contour map projected on the screen, ask a student to indicate to the class where he or she would place a trail for skimobiling (cross-country skiing, snowshoeing). The class evaluates the location.

6. What other factors besides topography need to be taken into consideration in plotting a trail for winter recreational activities?

# Contour Map


1100
800
900
900
800
1100
800
900
1000
900

**Pisgah State Park**

**Student Project Team**
**Worcester Polytechnic Institute**

## Part C. Wilderness Features and Trail Planning

1. Copy and distribute map 2, Water Systems; map 3, Wildlife Habitat; and map 4, Vegetative Inventory. Some of the resource maps in the Pisgah Simulation unit may also be useful in this activity (see page 309).

Using a transparency projection of map 2, Water Systems, ask the class how this data could be used to plan trails.

a. Where could trails be placed to minimize water pollution? Differentiate among trails for snowmobiles, skiis, and snowshoes.

b. Where should trails be placed to minimize erosion of soil into waterways?

c. Where should trails be placed to take advantage of the scenic attraction of bodies of water?

Project, in turn, maps 3 and 4 and conduct discussion of the effects of winter recreational trails on the features displayed by these maps. Continue to have students distinguish the relative effects of snowmobiles, skiis, and snowshoes.

2. Divide the class into small groups and ask them to construct a list of guidelines for plotting winter recreational trails. After each group has presented its guidelines to the class, help the class to arrive at a consensus of what these guidelines should be.

3. Provide the class with a copy of Snowmobile Trail Standards prepared by the State of New Hampshire and Johnnie Caldwell's comments on Cross-Country Ski trails. How close are the guidelines drawn up by the class to those of the experts? The class may revise their list after comparison and evaluation.

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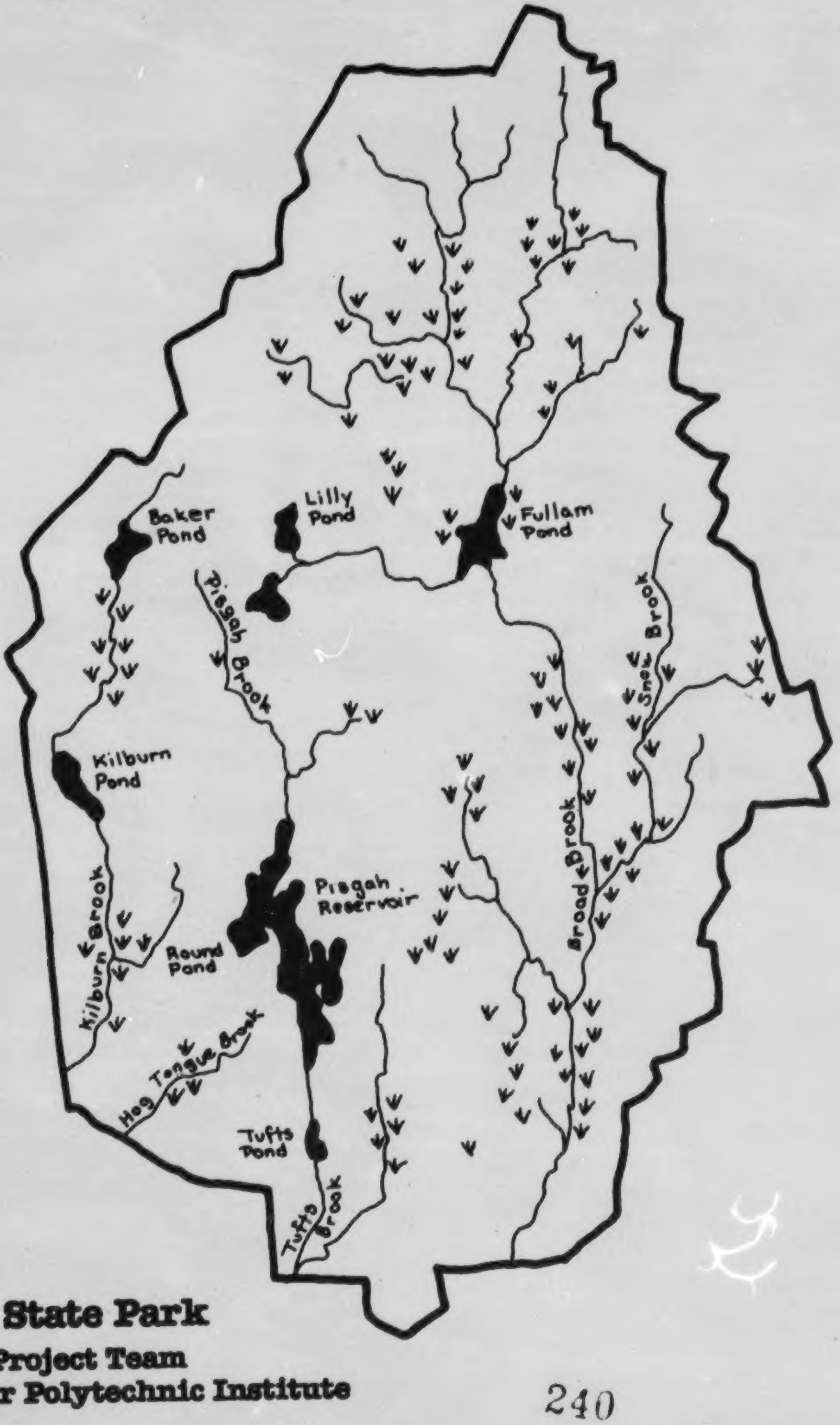
S

# Water Systems Map


Baker Pond
Lilly Pond
Fullam Pond
Pisgah Brook
Snow Brook
Kilburn Pond
Pisgah Reservoir
Broad Brook
Kilburn Brook
Round Pond
Hog Tongue Brook
Tufts Pond
Tufts Brook

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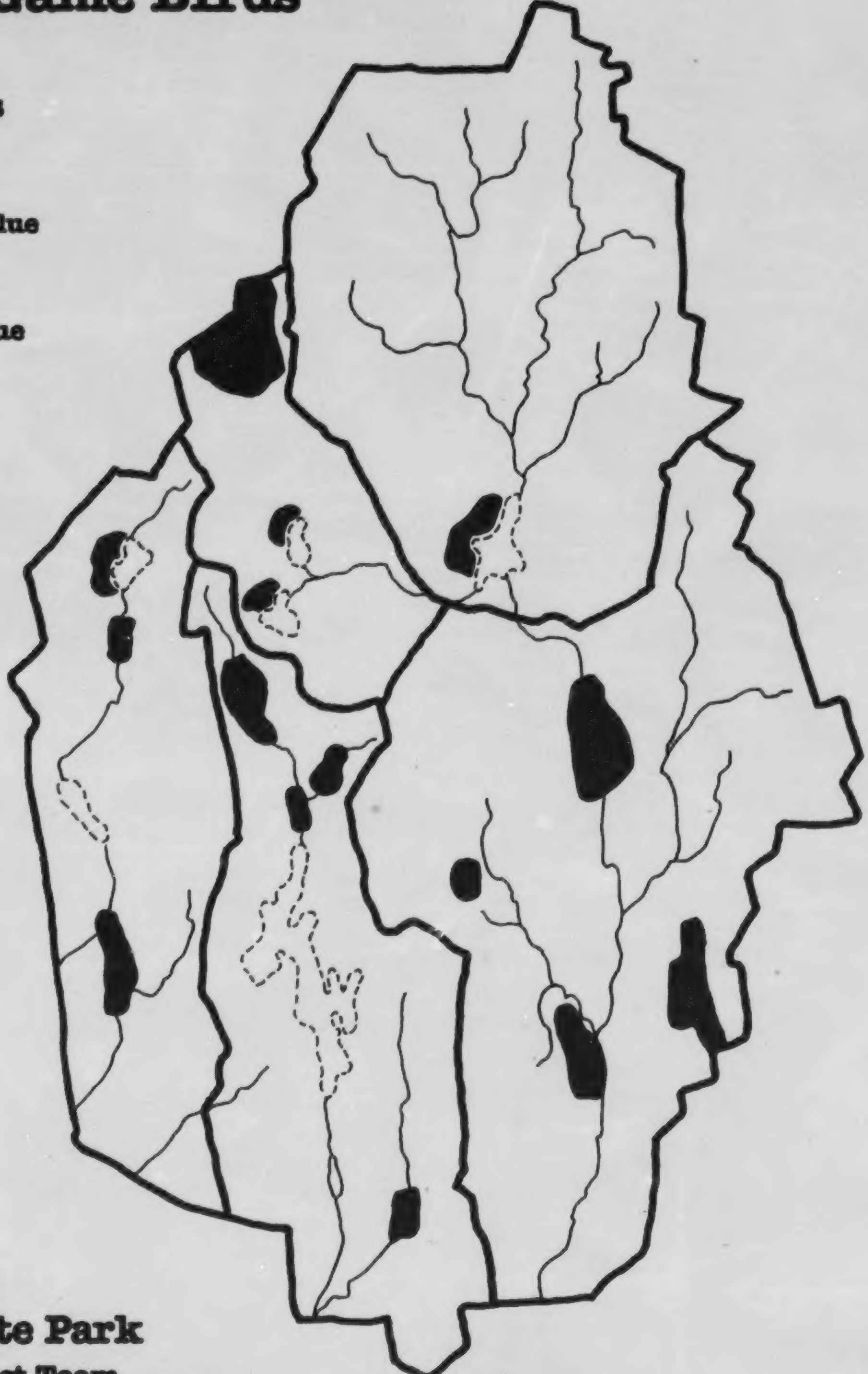
S

# Wildlife Habitat Map
# Upland Game Birds

**Habitat Areas**

■ High Value

☐ Low Value



## Pisgah State Park

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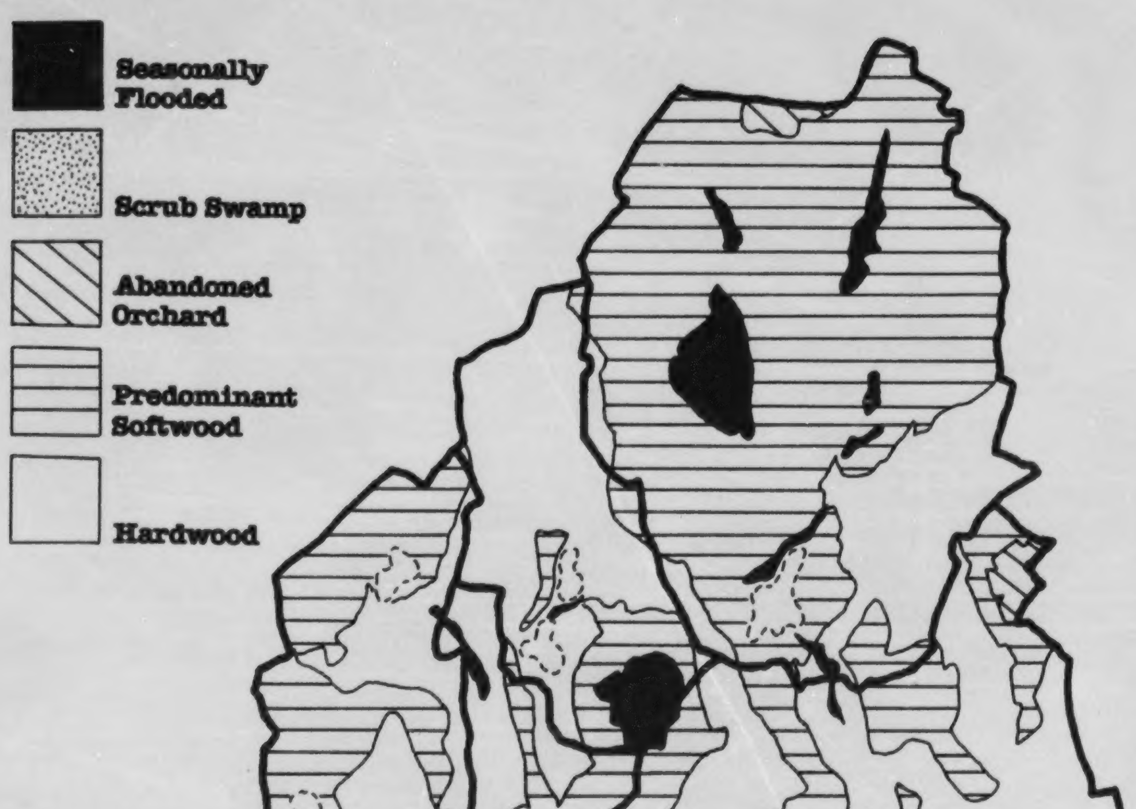
**Worcester Polytechnic Institute**

# Vegetative Inventory Map


Seasonally Flooded
Scrub Swamp
Abandoned Orchard
Predominant Softwood
Hardwood

**Pisgah State Park**

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**Worcester Polytechnic Institute**

# New Hampshire Snowmobile Trail Standards

## Trails, General Information

Where suitable and available, existing trails or unused roads, power lines, etc. shall be used, when possible, and upgraded where necessary to meet minimum requirements. New construction and clearing shall be kept to a minimum, except where major improvement work or new trail location is required. Landowner input shall be necessary where new location or development is intended, where earth moving and heavy clearing, or cutting is involved.

## Terrain, Safety and Other Use

Each trail shall traverse as much variety in terrain, vegetation, and scenery as possible. A safe trail which does not interfere or conflict with other resources or outdoor users shall be maintained. Conflicts with cross-country skiers and snowshoers shall be avoided where known problems exist. Separate trails for snowmobiles are desirable.

## Deer Yards and Plantations

Trail shall be routed away from deer yarding areas. Tree plantations shall be avoided, as well as all areas of conflict. Landowner input shall be necessary in this regard.

## Water Crossings and Bridges

Trail crossings over any water courses which have a constant flow shall require either culverts or bridges. Bridges to be constructed and culverts to be installed shall meet Bureau requirements as to location, height above normal high water and size, together with any conditions imposed by the Special Board and Water Supply and Pollution Control Commission. Culvert length shall extend beyond the intended trail surface to be groomed. All bridges shall be required to have guard rails as specified by the Bureau. Normal dry water courses may be crossed with a brush bridge, as approved by the Bureau, which shall be removed in the spring. Crossings of lakes, ponds, beaver dams, bogs, swamps, or areas of known standing water with trail are prohibited.

## Obstructions

Obstructions in the trail bed, stones, rocks, etc. shall be removed or routed around.

## Turning Distance

A minimum turning distance of 25 feet is required. Minimum curve radii shall be 50 feet, with up to 100 feet on wide, heavy-use trails.

## Grades

No grades exceeding 25% shall be allowed. Where 25% grades are involved, a straight-in run shall be provided. On heavy-use trails, no grades greater than 20% shall be allowed.

On grades greater than 15%, no curves shall be allowed, unless of switchback type approved by Bureau. Curves at top and bottom of grades shall not normally be approved.

### Heights of Land

Heights of land shall be crossed in a straight line.

### Slopes

Side slopes shall be avoided whenever possible. When side slopes more than 15% are to be used, earth work shall be required to develop a level trail way. No side slope more than 35% shall be approved, unless no other route is possible. In such cases, extensive earth work or retaining walls may be required and approved by the Bureau.

### Earth Work

Wherever earth work is required in trail development, or improvement, seeding and mulching shall be required. All disturbed soil shall be seeded to prevent erosion.

## Suggested Cross-Country Ski Trail Standards

Johnnie Caldwell (U.S. Cross-Country Ski Team Coach, 1965-1972) had made these comments about cross-country ski trails:

a. Trails should be skiable with four to six inches of snow. (In other words, they should not be so rouch or brushy that this much snow won't smooth out the trail surface.)

b. Trails should be about 10 feet wide.

c. Overhanging branches should be cut as high up as you can reach so that in deep snow heads won't be brushing against limbs.

d. Trails should be about 1/3 flat, 1/3 uphill, 1/3 downhill.

e. Trails should be reversible. This means that it should be safe to ski in either direction on the trail. Generally, going uphill is safe enough, but downhill slopes among trees or boulders can be dangerous if they are too steep.

f. Trails should not run through swamps or over brooks. When ice thaws, water may seep into the snow and ruin the skiing conditions.

g. There should not be sharp turns in a cross-country trail.

## Part D. An Environmental Impact Statement

For most major changes in land use an environmental impact statement is required by one or another agency. One such statement is reproduced here as an illustration:

Ask students to read the statement (not all of it will be understood, but the gist is clear) and then assign them to compose a similar statement in the style of the model for the guidelines they have drawn up.

OFF-ROAD VEHICLE USE: WENATCHEE NATIONAL FOREST. Department of Agriculture, Forest Service, Wenatchee, Washington. February 1977 (CEQ: April 21, 1977); 25 pages + 5 appendixes. . Forest Roads . Forest Trails . Forests . Off-road Vehicles . Recreation Resources (Impacts) . Wildlife (Impacts)

PURPOSE OR ISSUE: Regulation of off-road vehicle use in the Wenatchee National Forest in Chelan, Kittitas, and Yakima counties, Washington is planned pursuant to Executive Order 11644 of 1972 on the Use of Off-Road Vehicles on Public Lands. Motor vehicle use would be permitted on 991.5 miles of forest trails, cross-country travel would be discouraged, and area closures would be implemented where needed. Off-road vehicles would be banned from 44,716 acres during the summer, and snowmobiles would be prohibited on three areas totaling 9,310 acres and established ski areas during the winter, in addition to wilderness and intended wilderness areas. The plan also would reduce the trails open to trail bikes by 4.5 miles.

POSITIVE IMPACT: Regulation of off-road vehicles on areas and trails would enhance the long-term productivity of public lands. By discouraging cross-country travel, adverse effects on undiscovered historical or archaeological sites would be reduced.

NEGATIVE IMPACT: Noise and other disturbances due to off-road vehicles on public lands would conflict with other recreational uses. Use of the vehicles would increase soil erosion and disturbance of vegetation. Wildlife would be displaced and mating, calving, nesting, feeding, and resting activities would be disturbed. The vehicles would pose a fire hazard both directly from defective or tampered exhaust systems and indirectly from the campfires and smoking of vehicle operators. Disturbance of feeding habits or the intentional harassment of livestock also might result.

ALTERNATIVES CONSIDERED:

Maximize off-road vehicle use; increase closures of areas and trails to off-road vehicle use; restrict use of the vehicles to designated roads and deny their use on areas or trails.

PRIMARY ASSESSMENT CONSIDERATIONS AND/OR METHODS (in addition to routine physical, chemical, biological, or socioeconomic evaluations): Forest trail and off-road vehicle plans; comments received on the draft environmental impact statement.

# Supplementary Activities: Using the Winter Landscape

Introduction

The winter landscape is all the more appealing to us humans because after a day in the snow and the cold we can retreat to the comfort of food and warmth. But to the animals and plants, winter is the severest test of their strength and vigor. For the plants winter is the drought period. They must be adapted to exist for months on end without a drop of water. The animals must carefully balance the energy they can obtain from stored or foraged food with the energy required to generate warmth.

Winter recreation by humans adds stress to the winter landscape. Pressing down the snow reduces its insulation quality. Crushing tips of branches inhibits the springtime growth of woody plants. Cutting trails through the woods reduces the amount of food and shelter available to winter animals.

This is not to say nay to winter recreation. There is no evidence that carefully placed trails make a measurable difference in winter animal and plant life. The point is that winter recreation can and does do harm when it is carried out carelessly or done without paying heed to the needs of living things.

The supplementary exercises are designed to reinforce students' understanding that winter recreation has an influence on plant and animal life. The topics included here are all worthy of lengthy investigation and have, in fact, become areas of specialization among naturalists. But they are presented here with the understanding that they are only introductory exercises.

Part A. Winter Botany

In winter, without the benefit of leaves, identify 10 different trees. Use key (Pg. 263 ) to name the plants (see unit The Changing Yankee Forest for help with keys, p. 51 ) and then list the outstanding features of the plant:

Texture and color of bark

Position of twigs

Overall shape of tree

Description of needles

Following Through

a. Many of the plants in the key are important to wildlife either as food or as shelter. Try to find out what animals would be affected if very many of the plants were destroyed in making recreational trails.

b. Hemlock trees growing in clusters near hardwoods (maples, beech, oaks, birch) may serve as deer wintering yards. What special consideration do such areas require when it comes to planning recreational trails?

## Part B. Reading Tracks in the Snow

Use an animal track field guide (such as Olaus J. Murie's A Field Guide to Animal Tracks or Donald E. Stokes' A Guide to Nature in Winter to identify tracks and other signs of animals and birds. This field work may be done in conjunction with the measurement of snow depth (p 242) or the winter twig identification exercise.

If tracks and signs are plentiful, groups of students can work in acre-size plots identifying the tracks and counting the sets of tracks.

These are some guide questions for review of the observations:

a. What were the most common tracks in each area?

b. What were the most commonly seen tracks in all the study areas?

c. What area seemed to have the most animal activity? What reasons can you give for one area revealing more animal activity than another?

d. What snow conditions are the best for tracking?

e. Did you find any evidence that winter recreational activities had affected the movement of animals in the area?

## Following Through

Write a life history sketch of an animal whose tracks you observed.

## Part C. Winter Foraging Behavior of Insectivorous Birds

Students identify birds feeding on different trees, attempting to determine which trees are favored by which birds. Look for adaptations and behaviors which allow more than one bird to feed from the same tree.

Birds to be observed are:

a. Black-capped Chickadee - black cap, black bib, white cheeks, size smaller than a sparrow, approximately 5". Habits - extremely active, often hanging upside down.

b. Brown Creeper - brown camouflage, white underside, slender curved bill, stiff tail; size - approximately 5-6"; Habits - climbs trunks of trees in a spiral, then flies to base of another tree.

c. White Breasted Nuthatch - black cap, black eye, white cheeks, long bill, approximately 5-6"; Habits - stubby tail never braced against tree, often go down a trunk head first.

d. Harry Woodpecker - white back, large bill - 8-10".

e. Downy Woodpecker - white back, small bill 6-7".

Materials:

tree identification guide

bird identification guide

binoculars (helpful) but not essential

Each group of three students looks for a bark-foraging bird (nuthatch, creeper, chickadee or woodpecker). When one is found, identify it and record the species of tree. If a bird flies momentarily from tree A to tree B and then back to tree A, it is counted twice.

Do not record the observation if the bird is only sitting. Record only foraging activity on the tree.

Guide questions:

a. Do the species forage at random?

b. Did one species appear to favor one type of tree over another?

c. Were there any trees in your study area they did not forage on?

## Following Through

Describe the ways in which winter recreational activities might disrupt bird foraging behavior.

## Part D. Finding a Place To Sleep

Students place 3 oz. paper cups half full of freshly prepared gelatin suspension at selected sites in the snow to observe any differences in the amount of time it takes for the gelatin to solidify.

The cups of gelatin represent animals that have selected a spot and dug in for hibernation or a winter sleep (few animals are true hibernators). The time it takes for the gelatin to set is a rough indication of the amount of exposure an animal would have at that site.

Each time select a protected spot (a hole dug into the snow, inside a hollow log, within a rotten tree trunk, under a boulder or ledge overhang, etc.) within the study area. On signal the gelatin is mixed and put in place. Teams record the time it takes for the gelatin to set too firmly to be poured.

## Materials

plain gelatin

3 oz. paper cups and covers

digging tools

hot water in a thermos bottle

watch

thermometer

| Temperature | Unprotected Setting Time |
|---|---|
| -20°C to -10°C (-4°F to 14°F) | 5 to 10 minutes |
| -10°C to - 5°C (14°F to 23°F) | 10 to 15 minutes |
| - 5°C to 0°C (23°F to 32°F) | 15 to 20 minutes |
| 0°C to + 5°C (32°F to 41°F) | 20 to 30 minutes |

Guide questions

a. What were characteristics of the best sleeping places?

b. How might the data collected be used in planning winter recreation trails?

Following Through

Describe ways in which some animals survive the winter.

Part E. Story in the Soil

Using a soil borer, collect samples of soil directly under recreational vehicle trails and at a spot 100 yards away from the trail.

a. which soil sample retains the most moisture?

b. which soil sample shows the most evidence of soil organisms?

c. use a soil testing kit to determine any differences in pH and plant nutrients.

This activity can be done in the fall or spring.

Part F. At the Edge of the Trail

Walk along a winter recreation trail and answer the following questions:

a. what plants are found along trail edges that are not found 100 yards away from trails?

b. what difference in density of plants (plant/square meter) occurs along trail edges as compared to area 100 yards away?

c. measure (obtain the mass) of soil dust on the leaves of plants bordering the trail and compare it to that found on similar amounts of leaf cover located 100 yards away from trails.

# Winter Tree Identification Key

1a If the tree is a conifer, has cones and needles, go to 2a
1b If the tree is not a conifer and does not have needles go to 4.

2a If the needles are attached singly on the twigs and are about ½ inch long, it is an Eastern Hemlock.
2b If the needles are in bundles of 2 to 5, go to 3a

3a If there are 5 needles in a bundle, it is a White Pine
3b If there are 2 needles in a bundle and they are very brittle it is a Red Pine

4a If the leaf scars are opposite (directly across from each other on the twig) go to 5a
4b If the leaf scars are alternate (zig-zag on the stem) go to 7a

5a If the terminal buds are rough and dry, and the leaf scars are large and oval or shield shaped it is an Ash
5b If the terminal buds are not rough and dry, and the leaf scars are narrow and hard to see go to 6a

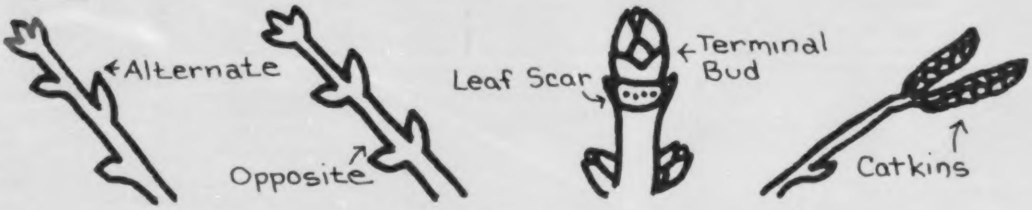
6a If the buds and new growth on the twigs are red or red-brown it is a Red Maple
6b If the buds and new growth on twigs are not red it is a Sugar Maple

7a If the twigs are covered with matted, wooly hair it is a Staghorn Sumac
7b If the twigs are not covered with hair go to 8a

8a If several buds are clustered at the end of the twig go to 9a
8b If the buds are not clustered, go to 10a

9a If the buds are rounded, it is a White Oak
9b If the buds are pointed it is a Red Oak

10a If there are catkins at the tips of some of the twigs, (short and stiff in winter) and the bark is thin smooth and peeling, it is a Birch
10b If there are no catkins, the buds are nearly an inch long (grow at a wide angle to the stem) and the bark is smooth and light grey it is a Beech



# Activity: Winter Recreation Survey

Introduction

What do people want done with the land? When it comes to their own private property people have some pretty strong ideas. When it comes to public land, then there may be a great variety of opinions. This activity encourages students to seek out these opinions in various ways.

Antioch/New England has studied Pisgah Park since 1977 and one of their concerns has been to find out how the people in the towns surrounding the park feel about its present and future use. A slide/tape show has been produced. The tape contains a wide spectrum of opinions about the park. (See Pisgah Simulation unit, pp 283). Surveys have been conducted by Antioch/New England and the results tabulated. The survey and its results are on p 269 ).

Our concern in this activity centers around Pisgah Park, also. We have suggested that surveys need constant updating. Results of one survey can be compared with earlier surveys. The data can be a valuable comparative record of changing values and opinions.

If you decide to survey opinions not about Pisgah Park but about the use of a piece of land near you, the same principles and methods apply.

No attempt is made in this activity to conduct a scientific poll. Some of the principles and problems of careful polling are suggested in The Paving of New England Unit on p . Surveys give general information, but perhaps the greatest value to the student is in the doing - reaching out to the community for data and learning "first hand".

Step One - Decide with your class what they want to find out. For example, if Pisgah were the subject, the questions might be:

1. In what outdoor recreation do you participate?

2. In what winter recreational activities do you participate?

3. What use, if any, do you make of Pisgah Park?

4. What would you like for Pisgah Park in the future?

Step Two - Decide with your class who will be in your surveyed group. Here are some suggestions:

1. High school students.

2. Parents of high school students.

3. Residents of local community at a public gathering place - a store, a meeting, on the street.

4. Residents of local community surveyed in their homes.

5. Those who are willing to return a survey questionnaire placed in a public place, mailed to all residents or solicited in some public way such as a newspaper or radio.

Step Three - Following the decisions about what and who will be surveyed, decide how the survey will be conducted. Three methods are described.

1. A survey sheet can be used in which those polled fill out the information. Two samples are included with this unit, one on winter recreation and one on all season recreation in Pisgah Park. Both of these survey sheets take only a few minutes to complete.

2. The quick interview with brief specific questions can provide a somewhat broader spectrum of opinion. Keep the questions brief and specific. Use no more than 5 questions. Leave room for comments.

Example: Do you know where Pisgah Park is? Do you use it? If so, in what way? If so, would you like to see it developed more or kept the way it is?

3. The taped interview can be effective because it gives data and emotional investment as well. Though people are often reluctant to talk to a microphone at first, they will relax after a little conversation. For high school students this is an excellent exercise in community relations. A team of two might tape and also photograph the setting and participants in the interview. If the pictures are made into slides and keyed to accompany the edited tape, the results of a survey can be made to be a moving experience.

## Sample Questionnaire Regarding Participation in Winter Recreation

What is your principal occupation________________________________

What is your age group______________________

1. What is your favorite winter outdoor recreation?

__________Skiing, downhill
__________Skiing, cross-country
__________Skating
__________Ice climbing
__________Ice fishing
__________Snowmobiling
__________Snowshoeing
__________Orienteering
__________Winter camping
__________Other

2. How far do you travel to follow your sport?

__________ 0 - 5 miles
__________ 6 - 10 miles
__________11 - 15 miles
__________16 - 20 miles
__________more than 20 miles

4. How much time do you spend on your sport?

__________More than once a week
__________Once every two weeks
__________Once a month

5. How much money does your sport cost you per year?____________

6. Which of these areas provide the best place for your recreation?

__________Own property
__________Other private property
__________State Park
__________Municipal Park
__________Commercial areas
__________National Parks

7. Do you feel there is conflict between your recreation and any of these?

__________Others in the same sport
__________Others in some other sport
__________Private landowners
__________Local, state or federal regulations

8. What further development of your sport is needed in the area?

9. Do you feel your sport has any negative impact on the environment?

10. Should local areas be set aside for your sport?

11. Do you belong to any local club that supports your sport?

12. If answer is yes:

    a. Name of club

    b. How many members ?

# Results of Questionnaire Circulated by Students at Antioch/New England Spring 1978

TOWN or GROUP - Total 307

1. What type of outdoor recreation do you and/or your family participate in?

| | | | |
|---|---|---|---|
| hiking | 73% | ice skating | 43% |
| snowmobiling | 26% | nature walking | 76% |
| x-country ski | 36% | family camping | 35% |
| hunting | 28% | backpacking | 33% |
| fishing | 53% | group camping | 13% |
| snowshoeing | 49% | canoeing | 38% |
| swimming | 67% | other | 12% |

2. How many times have you visited the park in the last year?

| | |
|---|---|
| 0 | 41% |
| 1 - 5 | 35% |
| 6 - 20 | 17% |
| 20 + | 6% |

3. Where in the park do you ordinarily go?

| | |
|---|---|
| Various | 33% |
| Fullam Pond | 39% |
| Reservoir | 25% |
| Nash City | 10% |
| Round Pond | 3% |

4. From what point do you enter the park?

| | |
|---|---|
| Winchester | 35% |
| Hinsdale | 33% |
| Chesterfield | 52% |
| Ashuelot | 33% |
| Various | 11% |

5. What type of activities do you participate in when you visit the park?

| | | | |
|---|---|---|---|
| Hunting | 21% | Picnics | 5% |
| Fishing | 27% | Skiing | 19% |
| Snowmobiling | 31% | Backpacking | 6% |
| Nature Walking | 26% | Camping | 5% |
| Canoeing | 5% | Swimming | 4% |
| Hiking | 72% | Snowshoeing | 12% |
| Ice Skating | 5% | Others | 8% |

6. Which of the following activities and facilities should be developed at Pisgah?

| | | | |
|---|---|---|---|
| Picnic areas | 33% | Motorboating | 1% |
| Guided nature trails | 45% | Baseball fields | 1% |
| No development | 47% | Group overnight camping | 16% |
| Backpacking | 24% | | |
| Non-motorized boating | 35% | Concessions | 1% |
| Supervised beach | 9% | Camping for recreational vehicles | 3% |

7. Do you think the park is:

| | |
|---|---|
| Overdeveloped | 4% |
| Adequately developed | 59% |
| Underdeveloped | 17% |
| No response | 20% |

8. What road access would you like to see into Pisgah Park?

| | |
|---|---|
| Road to Fullam Pond | 14% |
| Road from Fullam to Reservoir | 5% |
| Road from Winchester | 14% |
| Road from Chesterfield | 13% |
| Road from Hinsdale | 6% |
| Upgrade existing access roads | 14% |
| No road access | 43% |

9. If you would like to see better road access, would you prefer the road to be:

| | |
|---|---|
| Dirt | 27% |
| Graded | 7% |
| Gravel | 21% |
| All-purpose surfaced | 2% |

10. Would you like Pisgah to be a recreational area that generates income for the surrounding communities (concessions, private camping)?

| | |
|---|---|
| Yes | 6% |
| Not certain | 16% |
| No | 70% |
| No response | 8% |

# Activity: Playing in the Winter Landscape: Views on Winter Recreation

## Introduction

In this activity students are asked to compare and contrast statements made by naturalists and government representatives with those made by proponents of various winter sports. The fact that the quotations are lined up on the page does not imply a consistent pro and con relationship between these two interest groups. Discussion of the guide questions will lead to a clarification of values as they pertain to recreation and natural ecosystems.

Use the quotations to launch into a general discussion of the impact of winter recreation on land features. The catalogue of statements can be expanded to include quotations collected by students and their teachers. Supplementary field exercises are suggested to guide teachers and students who wish to extend the basic inquiry into the effects of winter sports on the land.

## Procedure

Use the quotations below to answer the guide questions that follow.

## Naturalist/Government Representatives

"The greatest single objection to snowmobiles is noise." Reporter in Audubon, Mar. 1974.

"Snowmobile noise can spoil the quiet pleasures of cross-country skiing and snowshoeing, whereas the reverse is rarely true. Thus land which might serve a variety of sports can become exclusive off-road vehicle territory by default." Conservation Foundation.

"Observations along the current use areas indicate that elk, bison, moose, coyotes, and geese pay no attention to the snowmobiles as they pass." Yellowstone National Park Environment Statement.

"Elk frightened by the noise and sight of snowmobiles moved to areas away from their normal feeding grounds." Idaho Fish and Game Department.

"When a snowmobile chases an animal, even just for fun, the animal may die of exhaustion later." Manitoba Conservation Officer

"A week without snowmobiles might require (a deer) to consume about 25,000 calories. A week's energy requirement when harassed by snowmobiles on the weekend might be 32,000 calories. Thus energy (food) enough for two normal days was expended just escaping from snowmobiles on two weekend days." State of New York, Department of Environmental Conservation.

## Winter Sportspeople

"In general, noise is no longer an important cause of conflict between ski tourers and snowmobiles. The worst of the noise problems are disappearing as the older snowmobiles are being scrapped, and machines meeting current standards are audible only when close at hand." Executive Secretary of Minnesota Ski Touring Clubs.

"There is anecdotal evidence that wildlife is more apt to move away from a snowshoer or cross-country skier or man otherwise walking through the snow than away from a snowmobile that passes at a distance." International Snowmobile Industry Association.

"Harassment or illegal taking of wildlife - whether by means of horse, truck, four-wheel drive vehicle, trail bike, skiis or on one's own two feet - cannot be condoned. These activities should not be confused with the sports of horseback riding, hiking, skiing, trail biking or snowmobiling." International Snowmobile Industry Association.

"Cross-country skiing is an undamaging sport to the environment. Unlike downhill skiing, it doesn't concentrate people into a destructive force which can explode its effects over wide areas." Lance Tapley in Ski-Touring in New England.

"Increased movement (of rabbits) must be attributed to a combination of machine presence and associated noise peaks above 80 decibels on the A scale". University of Wisconsin report Snowmobile Noise Effects on Wildlife.

"No person shall operate a snow traveling vehicle...which produces a sound level at any point fifty feet distant from said vehicle: from July 1, 1978 to June 30, 1983 of 73 decibels or more on the A scale; and after July 1, 1983, of 70 decibels or more on the A scale." Laws of New Hampshire, Chapter 418, Section 1.

"The snowmobile had very minimal impact as far as detrimental effects concerning the subject product's noise on wildlife, and the vehicle's impact on the vegetation which exists beneath the snow cover at our test sites throughout Wisconsin." University of Wisconsin's Mechanical Engineering and School of Agronomy.

"Snowmobiles inflict lasting damage to small trees and brushes by compacting snow. Snowmobiles have serious effects on the temperature of the soil (lowering it as much as 11.5°C) and reduce the number of soil microbes and fungi." Dr. Wallace Wanek, Bemidgi State College, Minn.

The only danger of environmental damage exists when snowmobilers, cross-country skiers, snowshoers or dog sledders inadvertently traverse snow-covered tree plantations." International Snowmobilers Industry Association.

(Wisconsin, Minnesota, and Michigan have programs of snowmobile safety instruction). "All three states think the safety program is paying off, not only in reducing the accident rate, but also in developing a more responsible attitude in young riders." Reporter in American Forests, Sept. 1974.

"We've asked people to cut back and lower their speed to save up to 25 percent of their gasoline." Spokeswoman for International Snowmobile Industry Association.

"Contrary to popular thinking, instead of damaging the wheat crop, the snow compaction caused by snowmobile treads and by the roller actually increased the yield of wheat.Snow mold was eliminated, the ground surface was not frozen hard, and the snow melted and entered the soil at a slower rate so that erosion was reduced." Joel Fletcher, Hydrologist at Utah Water Resources Laboratory.

"The casualty rate for snowmobiles is about six times that of automobiles. Most injuries involve the legs and feet, though there is an increasing number involving the head and neck." National Safety Council.

"It's anybody's guess how much less gas is being used by snowmobiles because of the energy crisis." Frank Opolka, Michigan Department of Natural Resources.

"Snowmobile exhaust emissions are minimal on a national basis, and in the principal centers of pollution, snowmobile emissions can hardly be considered additive." U.S. Environmental Protection Agency.

## Guide Questions

1. Find examples in which naturalists appear to be making contradictory statements. What might explain these opposing statements?

2. Find examples in which winter sportspeople promote their sport at the expense of other winter sports. What might explain the lack of unanimity among winter sportspeople?

3. There are two or three statements in which snowmobiling is joined to cross-country skiing and snowshoeing in order to argue a point. Why is it in the interest of snowmobilers to be associated with other winter sports?

4. The average noise level in a nighttime household is 47 decibels on the A scale. Use this fact to comment on the quotations concerning snowmobile noise levels.

5. How might a cross-country skier or a snowshoer respond to this statement by a snowmobiler: "We found that elk, bison, moose, even the fawns, wouldn't move away unless a machine was stopped and a person started walking. As long as you stayed on the machine and the machine was running, they never paid any attention. If you stopped the machine, got off and started moving, that was a different story. The thing that seemed to be disturbing to them was a man walking on foot."

6. As these statements show, there is not a barrier between naturalists and winter recreationists. List the statements by naturalists that support one or more forms of winter recreation.

7. Select the clearest example of contrary statements made by a naturalist and by a sportsperson and list two or three questions you would ask either of the two parties if they were available for questioning.

8. The statement by the EPA concerning exhaust emissions seems to exonerate snowmobiles. How might you set up a field test to generate data about any pollution from snowmobile exhaust?

## Following Through

Make a collection of current quotes and hard data pertaining to some aspect of the impact of winter recreation on the land.

# Activity: Jake Robbins' Dilemma

## Introduction

Of all the activities involving exercises, the moral dilemma is the most structured. It is based on the research and conclusions of Dr. Lawrence Kohlberg. He believes that individuals go through a series of stages in the development of their social and moral values. These stages develop from the concrete to the abstract.

The first two stages are called the Preconventional Level. In the first of these, good or bad is determined by threat or avoidance of pain or punishment. In the second stage, right action is determined by the rewards to the individual. In both, the central concern is the individual.

The Second Group of Levels is called the Conventional Level. In stage three correct behavior is what pleases other people or consists of what other people approve. Stage four is a further development of outside approval and is reached when one believes that right behavior consists of conforming to the laws of society. In stages three and four it is support of authority and convention which determines right action.

The third group of stages relies on moral values as motivation. In stage five the individual seeks to implement or change laws to conform to natural laws or human rights - basic principles agreed on by a thoughtful society. The sixth stage goes beyond the relativism or utilitarian nature of number five to an appeal to abstract moral principles such as the Golden Rule or the appeal to conscience.

Kohlberg feels that many people do not develop beyond level 2, 3, or 4, but our society requires that many people operate on level five. Kohlberg further says that individuals develop by recognizing a level beyond the stage at which they are functioning. Therefore, it is important to give students experience in recognizing their reasons for their decisions in moral dilemmas. Ranking and examining their reasons will reveal to them where they stand in relation to these six stages.

Evaluating the reasons for a decision is at the heart of this activity. Although Kohlberg feels that there is a correct answer in any dilemma viewed by a person operating at level six, it is not necessary for our purposes to implement this part of Kohlberg's moral philosophy. (Perhaps this concept is what some citizens find so threatening about Kohlberg's ideas.) Our purpose here is to have students examine reasons for right action and to rank them. You will find that they are quick to note one reason is "better" than another reason even if they are not operating under those motives themselves. This is because Kohlberg's ideas represent universally recognized principles.

### Directions

The teacher can provide copies of "Jack Robbins' Dilemma" to the class, but it is suggested that the story be read aloud and the situation discussed. A successful dilemma presents a no compromise situation for the central character. It does not ask what he/she *will* do, but what *should* be *done*. This dilemma deals with moral issues such as freedom of speech, property, truth, personal conscience. Jake's dilemma is between his personal and family well being and his role as leader of the community; in essence, the dilemma stems from the difference between individual and group needs, private and public property.

The class should divide according to their own opinions after reading the story - one group of those who feel Jake should support the warrant article to ban snowmobiling and another group of those who feel he should not. If there are some who cannot make up their minds, they may form a third group. Each group lists the reasons for their answer to Jake's dilemma. The fence sitters will have to make up two lists.

The teacher will take both lists and with help of the class evaluate the reasons. For example, which is a better reason for Jake's saying the town should *not* prohibit snowmobiling in the Town Woods: (a) he might lose the election or (b) snowmobiling is healthy family fun that most of his friends enjoy? A piece of acetate on an overhead will facilitate the ranking. The lists can be cut apart and rearranged by the value of the reason. After a lively discussion, the lists may be close to Kohlberg's model.

# Jake Robbins' Dilemma

Jake Robbins leaned back in his old desk chair. He carefully placed his feet on the roll top desk which looked like Jake himself, well worn but effective. It was piled high with the paper work that Jake had brought home from the town hall next door. Jake was head selectman of Thomlinson. He had been a selectman for years. Maggie, his wife, kept count; he tried to forget how many times he had run for office. Jake liked being a selectman. He felt strongly that people should serve their community, and he had worked for good schools, better highways, new water and sewer systems. He tried to listen to the citizens of Thomlinson. It was difficult sometimes to balance the more conservative wishes of the old timers with the requests for new facilities made by the newcomers to Thomlinson.

Today Jake was particularly troubled. It was a March morning, Town Meeting Day. Jake was facing a difficult decision about the meeting this evening. A group of citizens of Thomlinson had placed an item in the town warrant; it read: "To see if the citizens of Thomlinson will vote to turn the Town Woods into a Nature Conservancy."

The town woods, how Jake loved them! Huge pines, hundreds of years old, the forester had said. There were other wonderful things in the woods, rare swamp flowers in the open spaces. Birds and animals naturalists' delighted in studying. Jake knew every inch of the woods that reached into the town and almost touched his store and the town hall. Jake had directed the work of carefully laying out the snowmobile trail through the Town Woods. He had not intended to increase his snowmobile business with the trail, but that had been the outcome. In fact when he thought about it, that snowmobile trail had saved his business. Without the snowmobilers he might have lost his business.

Jake was thinking also about his other job - the store which he and Maggie operated. Being a selectman made only $1200 a year. (Maggie had figured out that he worked for $.15 an hour one year). So the store had to pay the bills. He and Maggie lived over the store so some expenses were held down, but Maggie's doctor bills were a constant worry.

Jake looked back over those years and how the store had changed. At first they sold general merchandise. Then the big supermarkets had pulled away the regular shoppers. Jake couldn't afford to compete with their prices. The main business of the store now was snowmobiles; snowmobile equipment and snowmobile service. Since switching his trade, things had been a little easier for him and Maggie financially. They enjoyed the people they met.

They enjoyed snowmobiling themselves. This was one way Maggie, with her bad legs, could get out. The local snowmobile club met in the back room where Jake sat now. They planned family outings, set up approved snowmobile trails, encouraged winter safety and conservation.

The warrant article would end all this. An affirmative vote would mean no more snowmobiles in the Town Woods. This past winter had brought disaster to the Town Woods. Snowmobilers had come in huge numbers. They brought business to Jake's store but destruction to the woods. The local snowmobile club couldn't control the traffic off the trails and the town couldn't afford more police patrols to prevent the fires, the cutting of fences, the endless mess and the noise. Even a lot of the old timers had joined with the new inhabitants who felt that their escape from city life to Thomlinson was in vain.

This group, The Nature Conservancy Advocates, had hired experts to catalogue the unique quality of the town woods. They pleaded that for their children's safety, for their own security, for the preservation of the forest itself; the Town Woods, they said, would have to be off limits to all snowmobiles. Jake could sympathize with these advocates. He saw the destruction, he dispaired of the vandalism. He and the other town officials had spent hours trying to come up with a compromise plan to limit or control the snowmobilers. But there was no possible way this could be done. Total prohibition was a practical solution and Jake would have to speak on the issue at the Town Meeting.

Tonight, when that article in the warrant was read, the pros and the cons would be emotionally debated. Then he knew the town meeting would turn to him and ask him the direct question and he knew his answer would sway many votes, maybe determine the outcome of the vote. Should Jake Robbins support or reject the article in the warrant to turn the town woods into a nature conservancy?

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# Pisgah Simulation: The Politics of Wilderness Development

## Overview

Land. Thirteen thousand acres of forested hills, with clear ponds, bobcat ledges, wood duck marshes, lanes meandering through ghost towns and past sawmill sites. Pisgah is an expanse of wilderness in New Hampshire's fast growing southwestern corner. As a complete watershed, Pisgah is an intact, natural system. It is both a perfect natural laboratory and a prime piece of land with many possibilities for development. In the Pisgah Simulation, you and your class have to make the decisions that will guide Pisgah's future. The options are numerous. What will you do?

The Pisgah Simulation is an accurate model of a very real situation. The map used as the game board is the trail map of the recently acquired Pisgah State Park. At present, the park is undeveloped and is used primarily by snowmobilers, hikers, skiers, hunters and fishermen. The character portrayals used in the simulation were developed from discussions and interviews with people interested in and responsible for the park. The resource maps provided for the players are reproduced from scientific studies done in the park. Your class will be facing exactly the same decisions that local planners and state officials are dealing with.

The game stems from our belief that:
1) students need to be involved in decision-making processes that simulate actual issues they will face in later life.
2) land use decisions are complex issues which transcend the bounds of any single subject area. Students need to build bridges between science and social studies courses to see the interplay between scientific facts and human values.
3) students need to pursue studies that require them to process information, weigh alternatives, make choices and then live with the results of their actions.

*Pisgah Simulation is based on "Oram: An Adaptable Frame Game," by William H. Liggett and Larry K. Stephenson appearing in Journal of Geography, February, 1979, pp. 57-63.*

The Pisgah Simulation is a model of the kinds of controversies that exist in land use decision making in your town today. Only through participation in decision-making processes will students become prepared for assuming responsible community roles.

## Objectives

1) To develop an understanding of the part special interests play in making land use decisions.

2) To learn about some of the social factors and elements of natural history that influence land use decisions.

3) To experience through role playing some typical attitudes toward land use.

4) To experience the process and effect of cooperation and compromise as they relate to land use decision making.

5) To identify sources of information useful in deciding how to use the land.

6) To re-evaluate and clarify personal feelings about land as a resource.

## Scheduling

We've found that the game fits well into a week's worth of classes - about five fifty-minute periods. This gives you sufficient time to do these things:

a) show "Pisgah - Recreation in a Vanishing Wilderness" a slide/tape show (optional)
b) begin playing the Pisgah Simulation
c) discuss related issues
d) finish the simulation
e) organize a follow-up discussion and activities.

If you're able to give more time to the game, it will be a richer experience, allowing you to fully explore its possibilities, but a week is sufficient. The following is only a suggested framework. Please abandon or improve upon it.

Day 1:

The game works best if it's introduced through viewing "Pisgah - Recreation in a Vanishing Wilderness." This 27-minute slide/tape show beautifully portrays the park's landscape, the people who use it and the prospects for the park's future. It highlights many of the issues that will be dealt with in the game in an unbiased, yet provocative manner.

To arrange a viewing of the slide show, contact the Pisgah Project Coordinator,
Environmental Studies Dept.
Antioch/New England Graduate School
Roxbury St., Keene, N.H. 03431
Tel: (603) 357-3122
A staff member will bring the show to your school and help with a follow-up discussion.

After the slide show, the following values clarification activity will serve as a good transition to the simulation.

Values Clarification = Pisgah's Future

Place a continuum on the floor of the classroom or on the chalkboard. If you do it on the floor, have it stretch from one side of the classroom to the other. Number it at even intervals from 0 to 10 as indicated below. Then place, at opposite ends of the continuum, some of the pairs of statements (one pair at a time).

0 1 2 3 4 5 6 7 8 9 10

| | |
|---|---|
| Wilderness is a psychological necessity. | "A wilderness area is a waste of resources" |

| | |
|---|---|
| Snowmobiles should be allowed on designated trails throughout the park. | Snowmobiles should be excluded from the park. |
| The park should not be developed at all. | Camping, picnicking and boating facilities should be developed on the park's large lakes. |
| Hunting, fishing and trapping should be encouraged in the park. | Hunting, fishing and trapping should be eliminated in the park. |

Ask the students to "take a stand" along the line representing how they feel about each of the issues. This will encourage them to begin articulating their values. When the students have taken their places along the line, ask representatives from both ends of the spectrum to explain their position. Heated debate will likely ensue. As you try a new issue, students will want to change their position.

This activity will give you insight into how to assign roles in the game.

Day 2:

Roles in the simulation are designed to represent a range of groups from those interested in heavy development to those interested in minimal development. Essentially they vary in this fashion:

Local business people
Snowmobilers
Planning board
State Parks Dept.
Local landowners
Monadnock Sierra Club

High Development Interest ↔ Low Development Interest

Assign roles to students depending on their values expressed during the values clarification exercise the previous day. In other words, do some type-casting. This will encourage students to project themselves into the game. Once you've formed your groups - give instructions and begin the game. You'll probably have enough time to play about one round on this second day.

Day 3:

Play another round of the game and then stop to discuss issues. Consider questions like these:

Is there value in compromising with other groups?
What information do you need in order to make sound decisions?
Do snowmobiles really harm wildlife and the environment?
Why do certain groups start off with different amounts of power? Is this fair? (Essentially, we tried to represent the actual power these groups would have).
What affects whether an area is good for development or not?
Is the land getting sacrificed because some groups are interested in accruing power? Have you seen this happen in other situations?
How would you define a wilderness area?
To what extent should wilderness areas be protected? Why?
Who should have access to a wilderness area, everyone or just the physically fit?
Can a wilderness area also serve as a wildlife refuge?
Who should decide about management and future use of a wilderness area? The taxpayers? Everyone within a 30 mile radius? The Sierra Club?
What economic impact would be felt if an area in your town were to be designated as an official wilderness area-no motorized travel, no camping, etc.?
What impact--economic and other--would be felt if a wilderness area in your town became a shopping center? A tastefully developed housing area? A low-impact industrial park?

Numerous assumptions underlie the structuring of this game and if you spend some time elucidating them the game will be more valuable. Essentially, land use means looking at the structure of the landscape and seeing how it would best suit a variety of human uses. Sometimes either the land or the human uses get too much attention or too little attention. You need to direct discussion around these issues.

Day 4:

Play rounds 3, 4, and 5. You may not find it necessary to develop all sections of the park. See how your students' enthusiasm is faring. Encourage groups to interact and to defend their development strategies through reference to their resource maps.

Day 5:

Plan on having a day to discuss what happened and/or to go further into one of the issues presented. Look at what happened to the park and why it happened. You might want to make a transition to the final unit.

Following is an activity related to the game that has worked.

Snowmobiler Debate

a) Divide the class in half.
b) Have one group generate three reasons for why snowmobilers should be allowed in the park. Have the other group generate three reasons for their exclusion.
c) Allow each group to critique the others' reasons and then rebut the critiques.

The format will probably not turn out to be so tidy, but good discussions are generated that will demand students to draw on information acquired in the game. High school students feel strongly about snowmobiles - pro and con.

These kinds of discussion/debates can lead into research projects of many types. Some are listed under Follow-up Activities. Spreading the game out and providing for research time in between rounds might be a valuable way to play the game.

## Pisgah Simulation

*Additional copies of the board are available free of charge from:*
*Environmental Studies Department*
*Antioch/New England Graduate School*
*Roxbury St., Keene, N.H. 03431*
*Telephone: (603) 357-3122*

*Certain materials from this manual will need to be duplicated in order to carry out this activity.*

Background for the Leader

The simulation has five components:

1. interest groups (six)
2. geographical areas designated on a playing board
3. optional plans for the development of the geographical areas
4. power payoffs based on development plans
5. effects of decisions about development of the areas

Interest groups compete to develop the areas of the park and thus to obtain power payoffs. Each interest group begins the simulation with a certain amount of power. Payoffs resulting from development plans put into effect are then awarded to each group as play progresses. The decisions made in one round alters future payoffs as indicated on the Effects of Decisions Table.

An interest group consists of one or more players who assume the role of a group having an interest in the park. Roles are described on cards reproduced and given to the players. The interest groups are these: New Hampshire State Parks Department (DRED), Monadnock Snowmobilers, Local Business People, Monadnock Sierra Club, Local Landowners, and Planning Board. Beyond the role description, players in a group may establish their group's objectives ranging all the way from self-serving to wholly altruistic goals. The units of power (UPs) each group receives represents a combination of the group's financial resources, political clout, and organizational effectiveness.

PISGAH
STATE
PARK

Each area of the park has characteristics that make development through one plan rather than another more desirable. This is reflected in the power payoffs awarded at the end of a round of play. Thus, in addition to competition for power among the interest groups, there is a backlash effect originating from the inherent value of the land itself. Pisgah is a silent, seventh interest.

Plans for development make use of various resources described for each area. Maps showing such resources for snowmobile use areas, wildlife habitats, plant types, etc., are made available to the interest groups. Players are encouraged to use any resource materials they can find to help them plan development of the areas. The plans themselves should be reproduced and distributed to the players. They include both single or limited use options and multi-use options. Single use plans usually carry higher payoffs for one interest group, while multiple use plans often have lower payoffs for individual teams but greater total payoffs for all interest groups working together.

The Table of Power Payoffs indicates the payoff in UPs for each area. These are awarded to each interest group according to the development option put into effect. Payoffs to each interest group are read from the table and awarded to the groups after a plan for development has been selected.

When an area has been developed according to a particular plan, players will be able to see the effects of their decisions. The purpose of this feedback is to show that one plan carried out in one area affects the way the remaining areas can be developed. The Effects of Decisions Table awards payoffs or penalties to interest groups each time an area is developed (immediate effect) or as a certain number of areas are developed along certain lines (long-term effect).

If the plans put into effect decrease the environmental impact by 4 points or the economic impact by 2 points, then interest groups gain or lose points automatically. The gains or losses are predetermined and are shown at the bottom of the Effects of Decisions Table. This is the way Pisgah responds to human activity. Interest groups are forced to take the land itself into consideration.

# Instructions for the Leader

1. Prior to play, you will need to reproduce these items from the indicated pages.
(a) Interest Groups - one or more copies for each of the roles for the six interest groups. Each group receives its own role only. (pp.291).
(b) Area Descriptions - one set of area descriptions for each interest group
(c) Plans for Development - one or more sets of eight plans for each interest group. (p 306).
(d) Pisgah Resource Maps - one or more copies of five maps per interest group (pp 309).
(e) Residents' Choices of Activities - one or more copies per interest group. (pp 318).
(f) Rules for Players - one or more copies per interest group.
(g) Development Markers - one set for the playing board. The symbols should be cut out and pasted to cardboard backing.
(h) Chance Event Cards - one set for the playing board.

You will also need to cut out the Units of Power.

2. The playing board is supplied in a pocket following p 290.

3. Summarize the purpose and strategy of Pisgah Simulation. The object is to determine the use of the 13,000 acres of a state-owned piece of land. How Pisgah will be developed depends on the motivations and values of the players.

4. Divide the whole group into five interest groups. Distribute Rules for Players and Interest Group Role Descriptions along with initial Units of Power to the groups. Assist groups in formulating objectives. Stress the role-playing aspect of the simulation. Do not attempt to force particular values on the players, however, since one educational merit in this simulation is value clarification.

5. Distribute descriptions of the geographical areas to be developed. Point out the references and resource maps players should use to set their objectives and make their decisions. The more research you can stimulate, the greater learning will take place as the simulation goes forward.

Explain and encourage research, collaboration, and negotiation. Some leaders allow the research and negotiations to go on for several class periods in order to maximize learning about land and land use.

6. When everyone is ready, select an area for consideration. (Since the Pisgah Reservoir area is prime, delay consideration of that area until about the third round.)

Set a time limit for decision making if it is your purpose to complete a round in a specified amount of time.

7. Invite students to consult the Table of Power Payoffs to see how many UPs can be earned for each development plan. **

8. When it appears that the interest groups are ready to vote, explain the way to use the UP cards (blue = 10 UPs, red = 5 UPs, white = 1 UP) and describe how they can best be handled secretly.

9. After the UPs voted for each plan for development have been given to you, tabulate the results on the blackboard or a large sheet of paper, so that everyone can see how the area is to be developed. The plan receiving the most UPs is the plan put into effect. Place a marker on the area to indicate its completed development.

10. Consult the Effects of Decisions Table and record the designated impact on the blackboard or sheet of paper. These values are not UPs, but reveal how the land was affected by the plan put into effect. Notice particularly whether the impact is such that the threshold is not passed. On the board next to the area name place the numeral 10. Add or subtract from 10, the values that correspond to the plan and the area under consideration. If the environmental impact values do not total at least six, or the economic impact values do not total at least eight, announce the gains and losses of UPs indicated on the table.

11. After a round of play ask the groups if they want to consider a chance event. If so, have a player select a card from the deck of Chance Event cards and read the event aloud. The Chance Event will indicate any further changes in UPs.

12. Discuss the play completed at the end of each round. Then select the next area for development and proceed. The only difference in subsequent rounds is that development of areas already completed will have to be taken into consideration.

13. After a round or two have been played consider suspending further play while groups research questions such as these:
(a) what is the effect of snowmobiling on plant and animal habitat?
(b) what nearby businesses are likely to benefit from recreational development of Pisgah?
(c) what are some special uses to which other state parks have been put?

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** Some leaders have found it simpler to postpone an explanation of the Table of Power Payoffs until after round one. They find that players make better use of the table following a brief introduction to the simulation. The Table of Power Payoffs should be regularly consulted, however, during each round after the first.

**S**

## Interest Group

New Hampshire State Parks Department (Part of the Department of Recreation and Economic Development--DRED)

Units of Power = 50

As the owners and purveyors of the park, you have the most to say about what will happen to the land. There are, however, a number of different interests within your department. Your director is interested in keeping the park in its wilderness state with improved access and parking areas on the edges. Other department members stress the importance of appealing to a variety of users and point out the possibilities of revenues being generated if more people use the park. Still others in the department want to maintain wildlife habitat and build up game populations. Almost everyone wants to see cooperation between snowmobilers and skiers so that neither group demands an unfair share of the land in the park. Your department doesn't have much money for development of Pisgah at present, but you anticipate more revenues in the next five years.

- - - - - - - - - - - - - - - - - - - - - - - -

**S**

## Interest Group

Monadnock Snowmobilers    Units of Power = 30

Your group has been using the excellent trails in the park for the past ten years. As responsible snowmobilers you have become concerned with the problems of using private land, and you've aimed more and more at using designated snowmobile trails in public areas. Pisgah Park is one of the best places in the Monadnock Region to snowmobile. There are a variety of trails for novice and expert snowmobilers and you can explore a large area in the park. You're not particularly interested in development that might spoil some of the wilderness qualities of the park, though you admit that most other recreational development would happen during the summer and wouldn't interfere with your winter sport. You like to hunt and fish and you wouldn't mind having access to the park for cutting cordwood.

**S**

## Interest Group

Local Landowners Units of Power = 20

All of you own land near to, or abutting, the park. Some of you have used the park for your entire lives and you know all its special places. You've hunted and fished there for years, know the exact pools where the small mouth bass are, and know where the deer are in hunting season. For the most part, you'd like to keep the park the way it is. It's O. K. for New Hampshire people to use it, but when you have lots of outsiders coming in, they disregard your private property and cause problems. Local snowmobilers are your friends, but snowmobilers from Massachusetts and Connecticut aren't as considerate. You like having access to the park to cut your cordwood. You like your privacy and you'd like to see Pisgah stay the way it is.

**S**

## Interest Group

Monadnock Sierra Club Units of Power = 30

As environmentalists, your primary interest is in maintaining the park as a wilderness area. You feel that the state was wise to acquire an entire watershed and you see great possibilities for natural science study in a large tract of wilderness located so close to a fast-growing area. You support low impact uses of the park such as hiking, back-country camping, cross-country skiing. You're opposed to motorized recreation because of its effects on wildlife populations and the disruption of people's wilderness experience. You feel that other state parks adequately serve the needs of snowmobilers and high impact vehicle camping and think that Pisgah deserves wilderness protection. You say: Once something is destroyed, it's gone forever.

**S**

## Interest Group

Local Businesspeople

Units of Power = 40

Your group sees the park as a resource to be developed for the benefit of the local community. Some of you are sawmill owners, motel and restaurant owners, and grocery store owners. As members of Chambers of Commerce you say that your communities could benefit from the increased use of the park through money spent in the surrounding towns and through the jobs made available by development. You see the park as a large tract which could easily support a variety of uses. You say: Everyone benefits from the development of Pisgah.

---

**S**

## Interest Group

Planning Board

Units of Power = 20

Your group is made up of members from the planning boards of Chesterfield, Hinsdale and Winchester, the three towns in which the park lies. Your role is a difficult one of trying to balance growth in your towns while maintaining the quality of life that makes your towns nice places. You'd like to see parts of the park developed for recreational uses, so you'd see benefit in camping and parking facilities at the Reservoir or at Fullam Pond, but not both, and not anywhere else. You're concerned about the heavy influx of people in the summer and the potential for increased crime if there are a lot of RV users in the park. You want to see local businesses grow, so you'd support the log and cordwood cutting and any park development that would benefit sporting goods stores and owners of restaurants in your towns. At the same time, you think of the park as a wild place with only low-impact activities going on there.

# Table of Power Payoff

| AREAS | Kilburn Pond | | | | | | Wilderness Ponds | | | | | | Fullam Pond | | | | | | Pisgah Reservoir | | | | | | Broad Brook | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| INTEREST GROUPS | DRED | Land | Sierra | Snow | Business | Plan | DRED | Land | Sierra | Snow | Business | Plan | DRED | Land | Sierra | Snow | Business | Plan | DRED | Land | Sierra | Snow | Business | Plan | DRED | Land | Sierra | Snow | Business | Plan |
| Development Plans | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| PURE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Wilderness-A | 6 | 10 | 25 | -- | -- | 6 | 10 | 12 | 30 | -- | -- | 8 | 5 | 12 | 30 | -- | -- | 5 | 10 | 15 | 35 | -- | -- | 2 | 5 | 8 | 20 | -- | -- | 2 |
| RV Development-B | - | -- | --- | -- | 30 | - | -- | -- | -- | -- | 20 | - | -- | -- | -- | -- | 30 | - | -- | -- | -- | -- | 30 | - | -- | -- | -- | -- | 20 | - |
| Swim-Boat-Camp-C | 6 | -- | -- | 4 | 15 | 2 | -- | -- | -- | 5 | 15 | 3 | 10 | -- | -- | -- | 20 | 10 | 5 | -- | -- | 5 | 20 | 10 | -- | -- | -- | -- | 5 | - |
| Logging-Cordwood-D | - | 5 | 4 | -- | 15 | 4 | 3 | -- | -- | 3 | 10 | 3 | -- | 6 | -- | -- | 15 | 3 | -- | 6 | -- | -- | 20 | -- | -- | 8 | 5 | -- | 20 | 4 |
| Snowmobiling-E | 5 | 3 | -- | 20 | 5 | 5 | 3 | -- | -- | 20 | 3 | 4 | 8 | 6 | -- | 25 | 8 | - | 8 | 3 | -- | 30 | 5 | -- | 8 | 4 | -- | 30 | 10 | 4 |
| MIXED | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| A + C | 5 | 3 | 12 | -- | 10 | 8 | 3 | -- | 10 | -- | 5 | 5 | 12 | 4 | 15 | -- | 12 | 12 | 10 | 5 | 12 | -- | 12 | 12 | 5 | 5 | 8 | -- | 8 | 3 |
| D + E | 4 | 5 | -- | 14 | 12 | 5 | 2 | 3 | -- | 15 | 10 | 4 | 5 | 5 | -- | 15 | 8 | 8 | 3 | -- | -- | 20 | 10 | 3 | 10 | 9 | 5 | 20 | 12 | 7 |
| B + E | 2 | -- | -- | 10 | 20 | - | -- | -- | -- | 10 | 15 | - | 3 | -- | -- | 10 | 15 | -- | -- | -- | -- | 15 | 20 | -- | 4 | -- | -- | 15 | 12 | - |

# Effects of Decisions Table

| | Environmental Impact | | | | | Economic Impact | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Areas | Kilburn Pond | Wild. Ponds | Full. Pond | Pisgah Reserv. | Broad Brook | Kilburn Pond | Wild. Ponds | Full. Pond | Pisgah Reserv. | Broad Brook |
| Development Plans | | | | | | | | | | |
| Pure | | | | | | | | | | |
| A | +1 | +2 | +1 | +2 | +1 | -1 | 0 | -1 | -1 | 0 |
| B | -4 | -5 | -5 | -5 | -3 | +2 | +4 | +4 | +4 | +2 |
| C | -3 | -4 | -4 | -4 | -1 | +2 | +4 | +4 | +4 | +2 |
| D | -2 | -3 | -3 | -4 | -1 | +2 | +1 | +3 | +3 | +4 |
| E | -3 | -3 | -3 | -4 | -2 | +2 | +1 | +2 | +2 | +3 |
| Mixed | | | | | | | | | | |
| A + C | -1 | -1 | -2 | -2 | 0 | -1 | 0 | -1 | -1 | 0 |
| D + E | -1 | -2 | -1 | -3 | -1 | +2 | +1 | +3 | +3 | +3 |
| B + E | -4 | -5 | -5 | -6 | -1 | +2 | +2 | +4 | +4 | +2 |

IMPACT INDICATORS
Impact value initially is 10

For each round that these effect values are equal to or less than 6 (the impact threshold):

- DRED gains 2 UPs
- Sierra gains 8 UPs
- Landowners gain 2 UPs
- Business loses 5 UPs
- Planning Board loses 2 UPs
- Snowmobilers - no change

For each round that these effect values are equal to or less than 8 (the impact threshold):

- Sierra loses 5 UPs
- Landowners lose 2 UPs
- Business gains 8 UPs
- Snowmobilers gain 3 UPs
- Planning Board gains 2 UPs
- DRED - no change

## Deer Virus

A virus infects the deer herd throughout the state necessitating a closing of the hunting season. The State Parks Dept. budget is cut severely and their attention is distracted from Pisgah.

State Parks Dept. loses 10 UP's

## Hurricane

A hurricane with winds up to 140 MPH sweeps through the park, leveling timber stands ready for harvest. Access roads, trails, and pondsides are a tangle of fallen trees and debris. Flash floods erode trails and wash out bridges.

Business people gain 8 (Timber Salvage)
Sierra Club loses 5 UP's
Snowmobilers lose 5 UP's
State Parks Dept. loses 3 UP's

## Vernon Meltdown

The Vernon Nuclear Power Plant, seven miles from the park, melts down.

The game ends
No one wins

## Forest Fire

A raging forest fire destroys the section of Pisgah just planned for development. Timber stands, underbrush, ground cover and duff are destroyed, ruining wildlife habitats and predisposing the area for serious erosion.

DRED (agency responsible for reforestation)
loses 5 UP's
Business loses 5 UP's
Sierra Club gains 3 UP's

**Chance Event**

**Chance Event**

**Chance Event**

**Chance Event**

### Mineral Discovery

A large deposit of iron ore is found within the boundaries of the park.

DRED (landowner) gains 10 UP's
Business gains 8 UP's
Sierra Club loses 8 UP's
Snowmobilers lose 4 UP's
Landowners lose 7 UP's
Planning Board loses 7 UP's

### Kilburn Pond As A Reservoir

The town of Hinsdale votes to use water from Kilburn Pond for the town water supply.

Sierra gains 5 UP's
Snowmobilers lose the right to use the area and also 5 UP's
The Planning Board gains 5 UP's

### Wilderness Rescue

A group of winter campers from the Sierra Club are trapped in a blizzard and are rescued by the Monadnock Snowmobilers. Both groups feel committed to working together on a compromise development strategy in the next round.

### Nature Center

The Nature Center was made possible through a large gift to the state, reserving extensive areas for wilderness nature study.

Sierra Club gains 10 UP's
DRED gains 6 UP's
Planning Board gains 5 UP's
Business loses 5 UP's
Snowmobilers lose 5 UP's

**Chance Event**

**Chance Event**

**Chance Event**

**Chance Event**

## Energy Crisis

As gasoline and home heating oil costs skyrocket, pressure is put on the state Parks Dept. to improve access to the park for more visitors and to allow more logging and cordwood operations. The New Hampshire Tourist Office and local landowners compel the State Parks group to accommodate their needs in the next round.

## Hiking Accident

A hiker is injured on unposted private land adjacent to the park when he trips over some old barbed wire. He initiates a suit against the landowner. The landowner's group unites to encourage a centralized camping facility around one of the lakes on the next round.

**Chance Event**

**Chance Event**

# Rules for Players

1. Your interest group will receive a description of your group role and the number of Units of Power (UPs) you will use to vote for development of some area of Pisgah. You will also receive a list of eight possible ways to develop Pisgah. Discuss among yourselves what your objectives are.

2. The leader will indicate the area to be developed. From the options you receive, select a plan for developing the area that will serve your group's interest and at the same time have the effect on the land that you consider appropriate. Maps and other information are available for you to study in reaching your decision. You may talk with other interest groups and try to negotiate a compromise so that UPs can be combined and increase the chances of putting a plan into effect.

3. You will receive cards which represent your Units of Power. When the leader calls for your group's vote, you will hand in cards equal to the UPs you want to spend to win the development decision. Keep the number of UPs belonging to your group a secret.

4. When all the cards are in, the leader will tabulate how many UPs each plan for development received. The plan with the most votes wins.

5. The leader will consult a Table of Power Payoffs, or ask you to look at it, and your group will change the number of UPs according to what the table says.

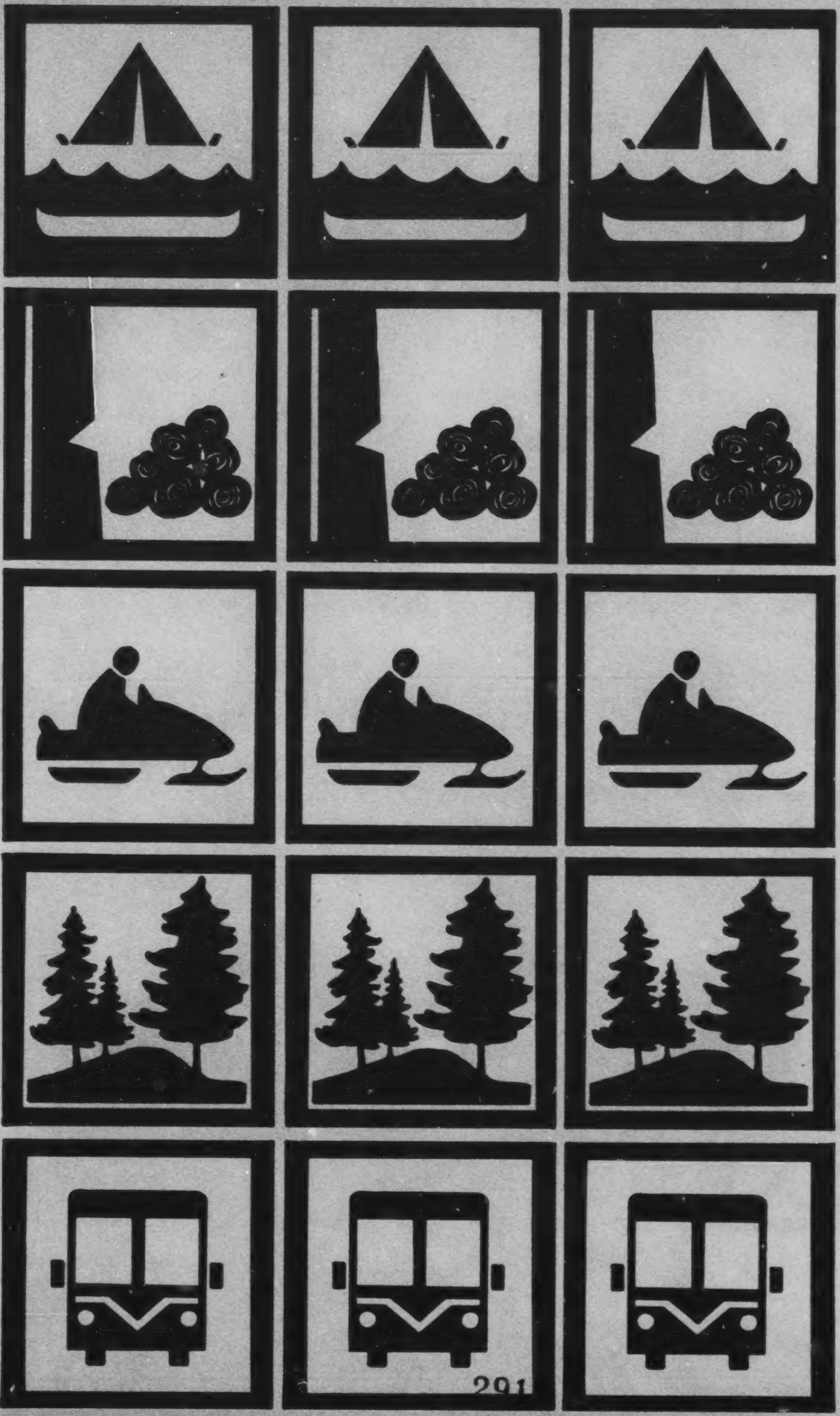
6. The leader will consult a Table of Effects of Decisions which will tell how the land itself was affected by the plan put into effect. This table may also change your UPs.

7. The leader will ask if you want to have a Chance Event occur. Chance Events are such things as forest fire, hurricane, nuclear meltdown, new roads, etc.

If the whole group votes for a Chance Event, your UPs may be changed.

8. The leader will select another area and you will go on to Round 2. This time, when you consider how you want to develop the area you will have to keep the development of the first area in mind.

9. Play continues until all areas have been developed. The interest group with the highest number of UPs at the end wins.



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# Plans for Development

## Pure Development Plans

### (A) Wilderness Preservation.

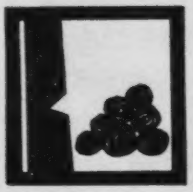
This plan will maintain most of the area in a primitive state. Hiking and cross-country skiing trails will stay as they are now with no further development. Hunting and fishing will be permitted, but no motor vehicles will be admitted. There will be no overnight camping. No activity that will alter the area in any permanent way will be tolerated.

### (B) Recreational Vehicle Development.

This plan calls for laying down paved roads and building up parking facilities to accommodate Winnebagos, vans, trailers, pickup trucks with campers, etc. Hook-ups to septic system, water supply, and electrical power will be available. Hot showers, laundry and toilet facilities, and playgrounds will be built and maintained. Swimming and boating areas will be developed. Fishing, but not hunting, will be permitted.

### (C) Swimming, Boating and Camping Development.

This plan will make available supervised beaches and nonmotorized boating marinas on the larger bodies of water. Concession stands will supply bathers' and boaters' needs. Overnight camping sites will be constructed to accommodate small tents (no overnight vehicles). There will be cooking units and garbage drops at each campsite as well as toilet and shower facilities for every three to four camps. Roads will be built to allow passage of cars and boat trailers. Fishing and hunting will be permitted.



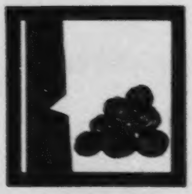
### (D) Logging and Cordwood Harvesting.

This plan permits lumber companies and individuals to cut down trees marked by state foresters for selective cutting. Individuals and businesses will be allowed to sign up to harvest lumber or cordwood to sell or for home use. A competitive stumpage fee will be collected by the state, with the income to be invested in reforestry practices and maintenance. Hunting and fishing will be permitted, but not overnight camping. No recreational facilities will be developed.

(E) Snowmobile Trail Development.
This plan will encourage the building of trails and bridges to permit maximum utilization of the area by snowmobiles in the winter and trail bikes in the summer. Trails will extend to the most scenic vistas and lead to bodies of water. A portion of the snowmobile and bike registration fees will be diverted by the state to the building and maintenance of trails. Hunting and fishing will be permitted, but there will be no overnight camping. Daytime fires will be allowed in designated sections only.

## Combined Plans for Development

(A,C) Wilderness Preservation and Swimming, Boating and Camping Development.
This plan will permit lighter recreational uses of the area at the same time preserving the wilderness condition as much as possible. Swimming, boating and camping will be reduced or eliminated where they are in conflict with the valuable habitat. There will be no concession stands, and toilet facilities will be of low-impact design. Hunting and fishing will be permitted in designated sections of the area.



(D,E) Logging and Cordwood Harvesting and Snowmobiling.
This plan permits selective cutting of logs and cordwood commensurate with recreational needs. State foresters and recreational specialists will determine where trails may be developed. No camping will be allowed and only minimal road building will take place. Hunting and fishing in designated sections of the area only.

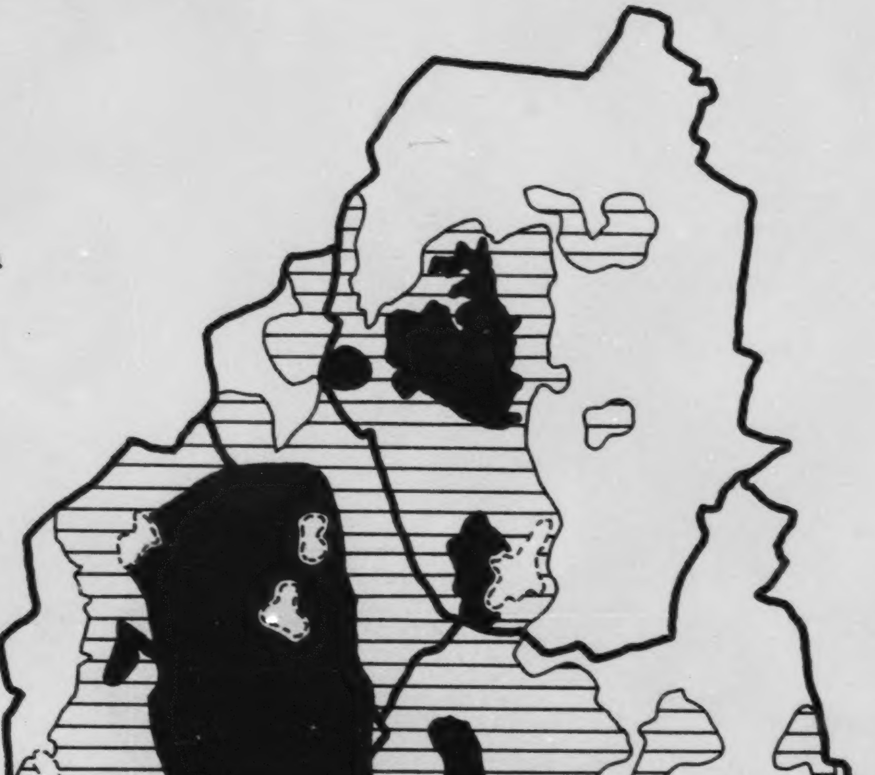
(B, E) Recreational Vehicle Development and Snowmobile Trail Development.

This plan makes maximum recreational use of the area, though the development of recreational vehicle sites will be less than in Plan B.  A compromise will be struck so that the sites for recreational vehicles will not interfere with snowmobile trails.  Swimming and boating facilities will be built and supervised.  Roads for vehicles and trails for snowmobiles will be contructed in separate parts of the area.  Hunting and fishing permitted in designated sections of the area.

# Inventory
# Wildlife Density

**Legend**

- ■ High
- ▤ Medium
- □ Low



## Pisgah State Park

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**Worcester Polytechnic Institute**

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**S**

# Suitability
# Durable Areas

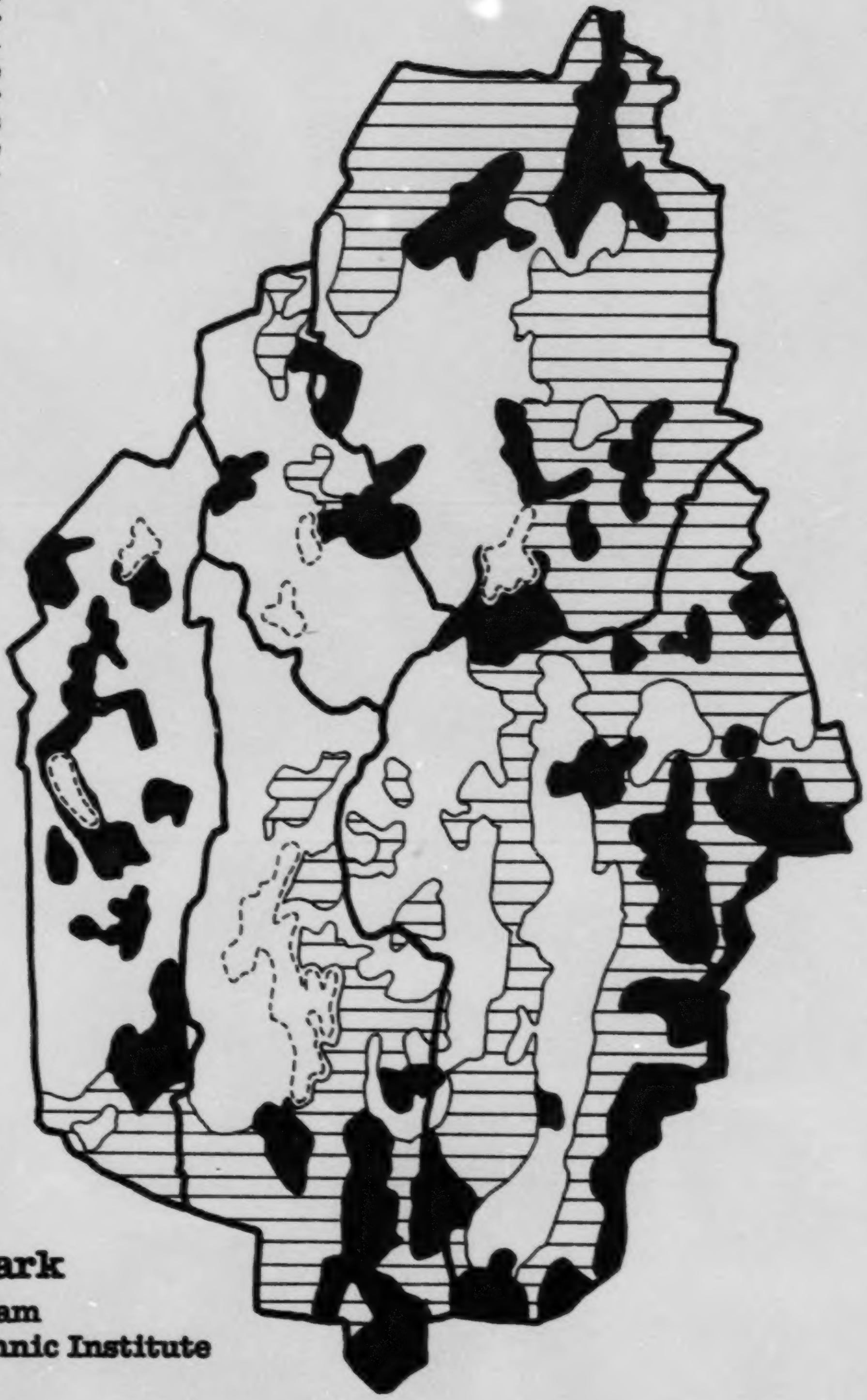
This map indicates areas that would be suitable for development. In the darkened areas: the slopes are low, the soils are good for septic systems, there is available water and wildlife would not be adversely affected.

**Legend**

■ **Most Suitable**

▤ **More Suitable**

□ **Less Suitable**



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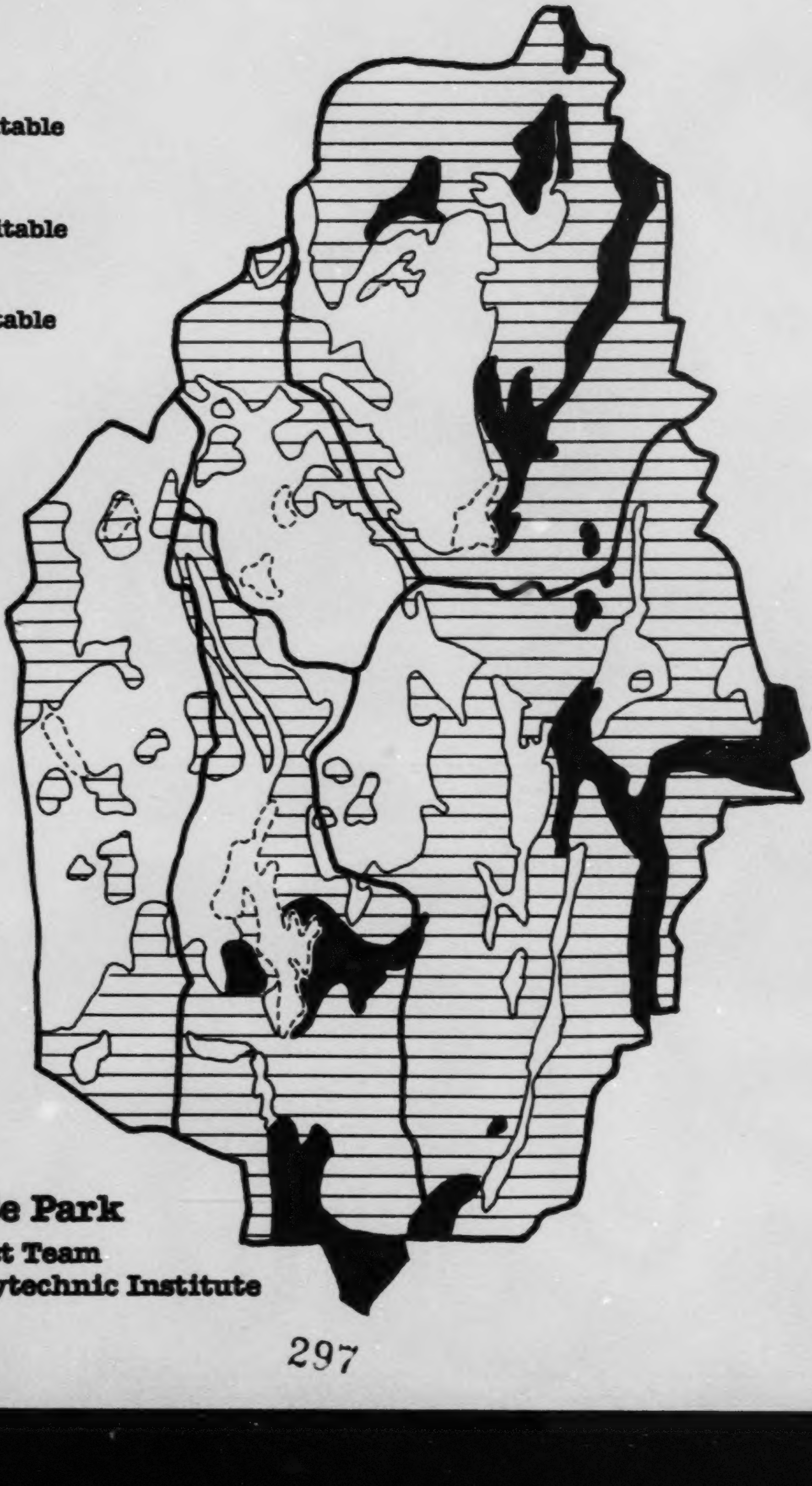
# Suitability
# Snowmobile Use Areas

**Legend**

■ **Most Suitable**

▤ **More Suitable**

☐ **Less Suitable**



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# Wilderness Experience Suitability Areas

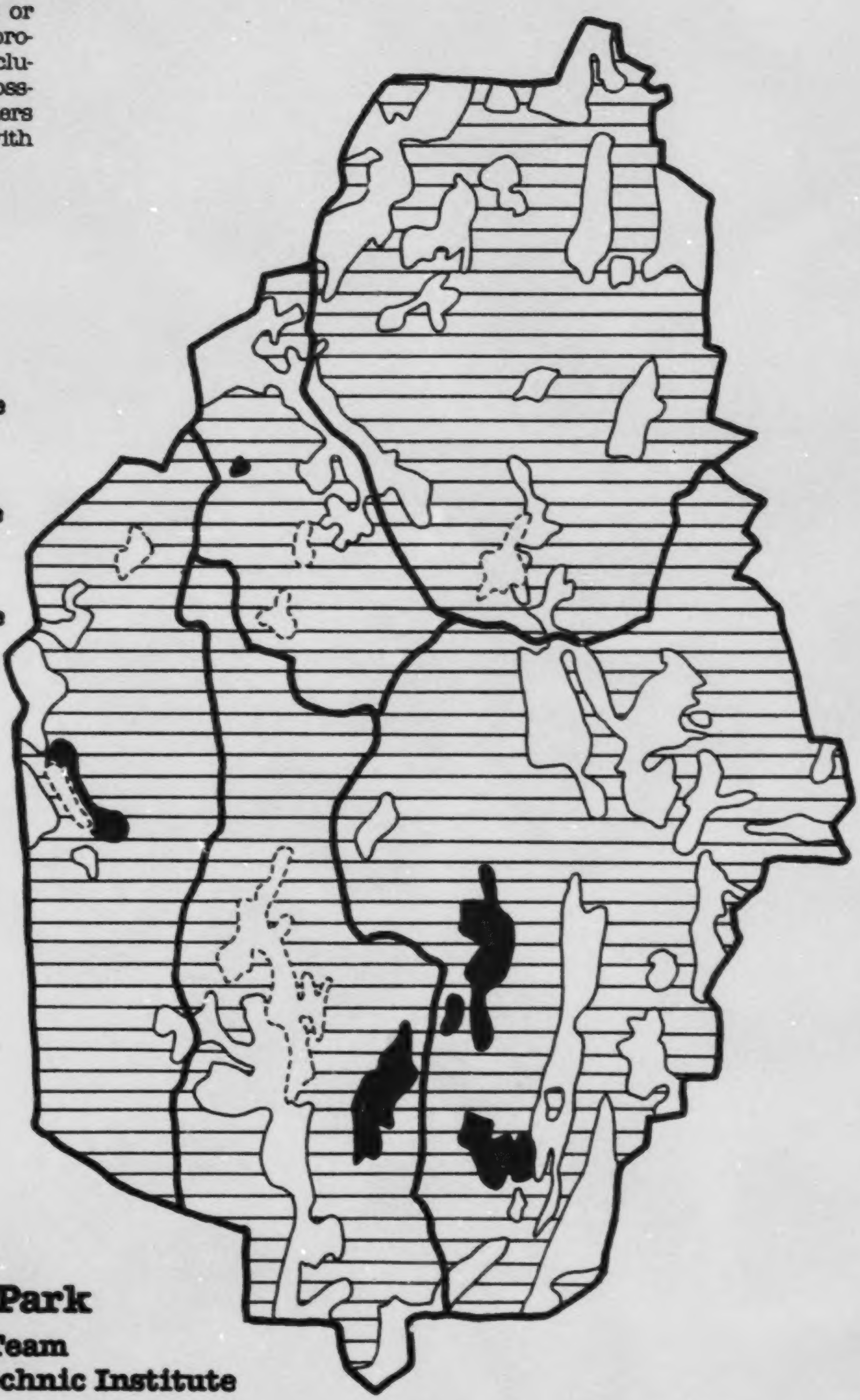
Areas that are shaded or hatched are more appropriate for providing seclusion for backpackers, cross-country skiers and others wishing close contact with wildlife.

**Legend**

■ **Most Appropriate**

▤ **More Appropriate**

☐ **Less Appropriate**



## Pisgah State Park

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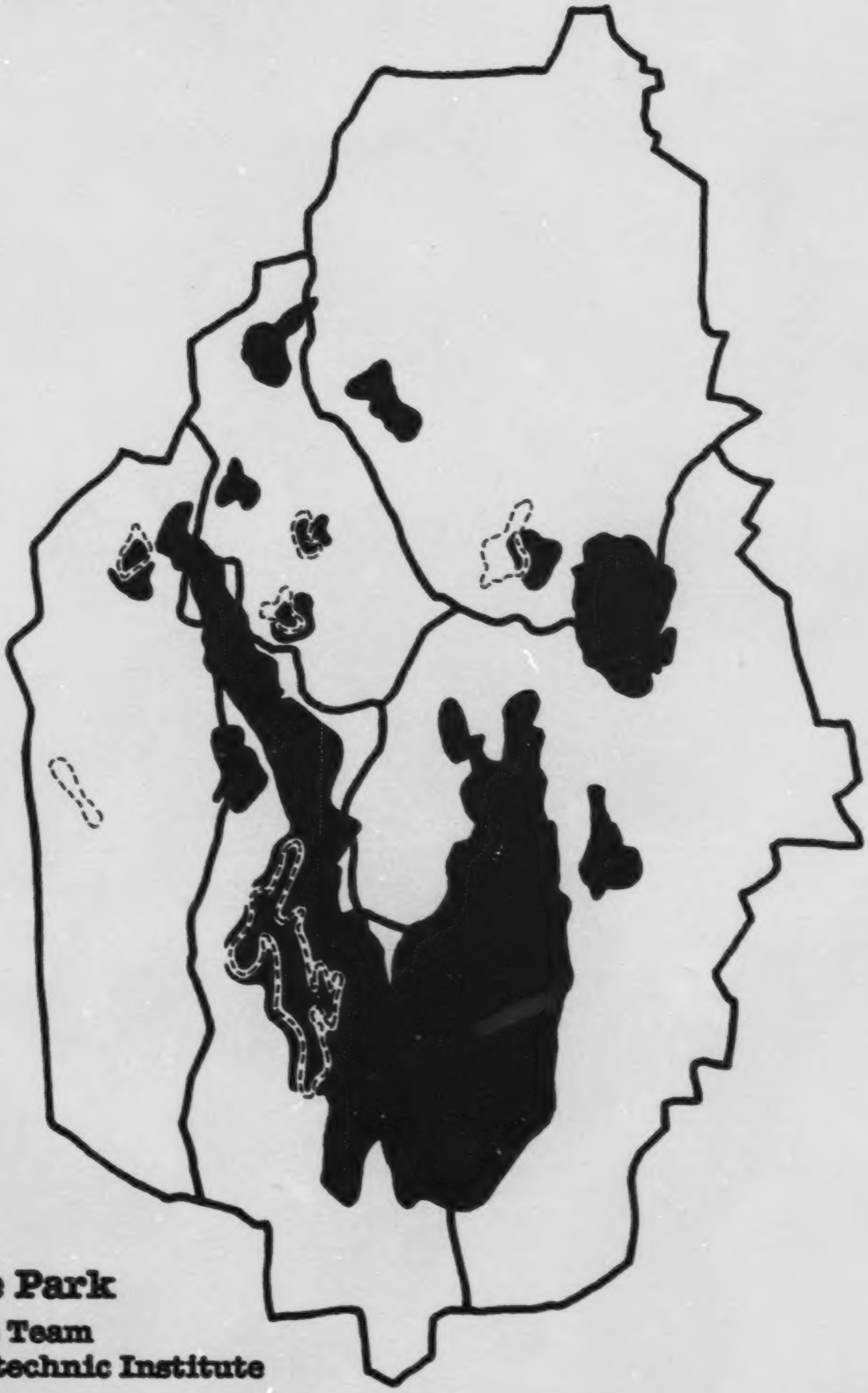
# Suitability
# Visual Interest Areas

**Legend**

■ High

☐ Low



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## Residents' Choice of Preferred Activities and Facilities for the Park

Figure II-7

| Activity | Percent of Respondents Who Prefer Each Activity |
|---|---|
| fishing | 70.0% |
| nature walks | 65.0% |
| swimming | 63.3% |
| family camping | 58.3% |
| hiking | 58.3% |
| ice skating | 41.7% |
| hunting | 40.0% |
| canoeing | 40.0% |
| snowshoeing | 38.3% |
| backcountry camping | 36.7% |
| open field sports | 36.7% |
| boating | 31.7% |
| group camping | 25.0% |

| Facility | |
|---|---|
| Parking Inside Park | 31.7% |
| Multi-seasonal Use | 30.0% |
| Fringe Parking | 26.7% |

Information from:
Student Project Team, May 1976
Worcester Polytechnic Institute

## Areas

Kilburn Pond
Wilderness Ponds
Fullam Pond
Broad Brook
Pisgah Reservoir

The Kilburn Pond Area includes the watershed of Baker and Kilburn Ponds. These attractive, rugged ponds are easily accessible from Rte. 63 via a good wood road. This area used to serve as Hinsdale's water supply and could do so again in the future. Snowmobilers often frequent this area as it is easy to get to. As there are many steep slopes, logging would be difficult, but there are also many flat areas around Kilburn Pond that could be developed with relative ease. The hiking-skiing trail across the Pisgah Mountain ridge starts just north of Kilburn Pond.

The Wilderness Ponds Area includes a number of small, steep hills and Lily and North Round Ponds. These beautiful and isolated ponds are tucked into the hills and are considered one of the essential wilderness elements of the park by environmentalists. Hunting and fishing are excellent in this area and snowmobilers enjoy finding their way into this secluded area. Access to these ponds is somewhat difficult due to poor roads.

The Fullam Pond Area includes Fullam Pond and an extensive marshy and swampy area to the north that drains into the pond. Fullam Pond itself is large and beautiful -- well suited for supporting recreational uses. The State Parks department has considered improving the road into Fullam Pond and developing a camping area here if local residents are supportive and funds become available. This area also includes a part of Nash City -- an old settlement. A hill cemetery and many cellar holes can be found to the northeast of the Pond. The Parks Department considers the access from Route 9 west appropriate as the main entrance to the Park.

The Board Brook Area includes all of the watershed of Broad Brook south of Fullam Pond. This is the largest resource area in the park, but it contains no large body of water. Many hillsides are present and a good road follows the brook up the valley. There appears to be a good amount of available timber in this area. The stream itself is very attractive, marshy for most of its course and filled with many active and inactive beaver ponds. Reports indicate this is less suitable wildlife habitat than other areas in the park, though some environmentalists question this.

The Pisgah Reservoir Area is the heart of the area. The area includes the drainage basin of the reservoir and a substantial part of many of the highest hills in the park. The reservoir is very beautiful and extensive with many coves and inlets. Wildlife abounds around the reservoir and in the surrounding hills. Environmentalists want to protect this as the keystone to the park while snowmobilers and business concerns see this as the park's major calling card. A good road goes into the reservoir from Rte. 119, but a half-mile section is very steep and would present access problems. The Reservoir would be suitable for a variety of recreational uses, but could deteriorate if overused.

MAP OF PISGAH STATE PARK REMOVED DUE TO OVERSIZE.

Teachers should reproduce 5 copies of this page.

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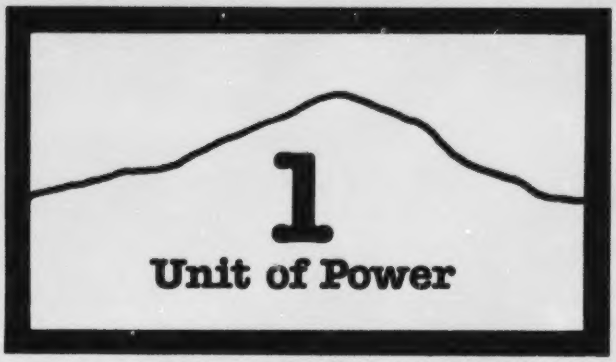
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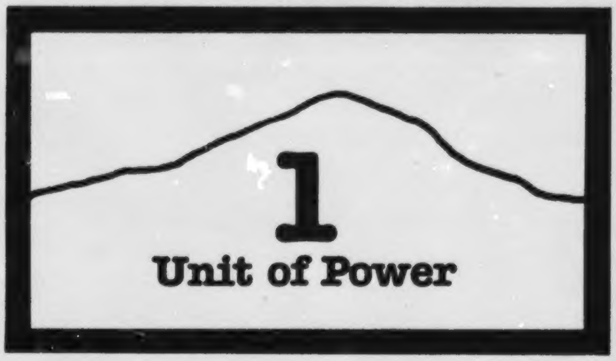
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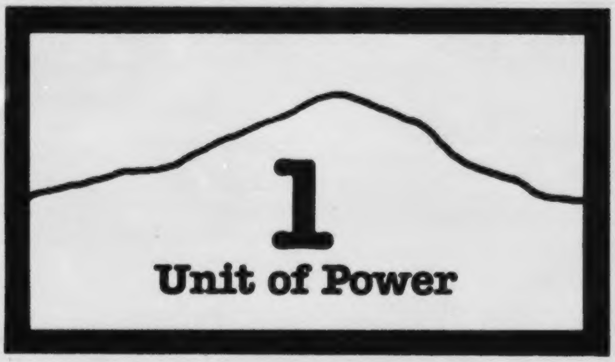
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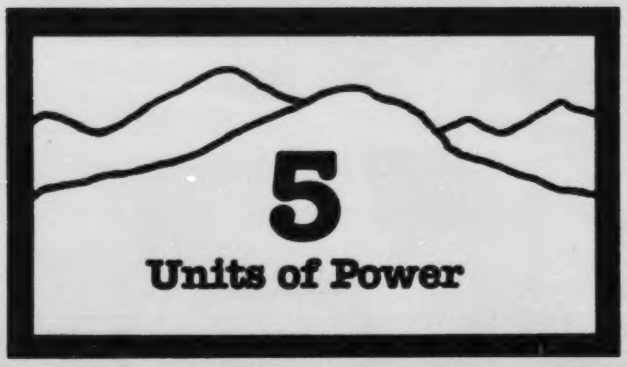

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**5**

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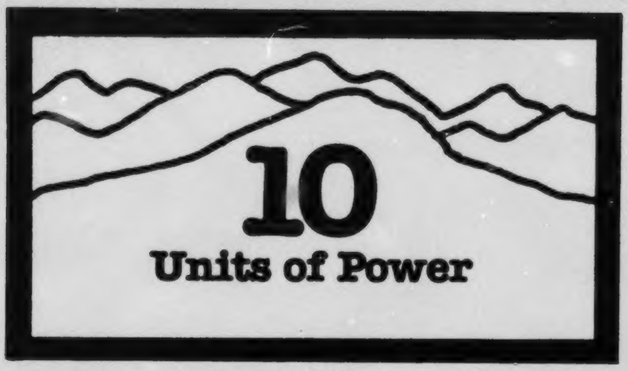
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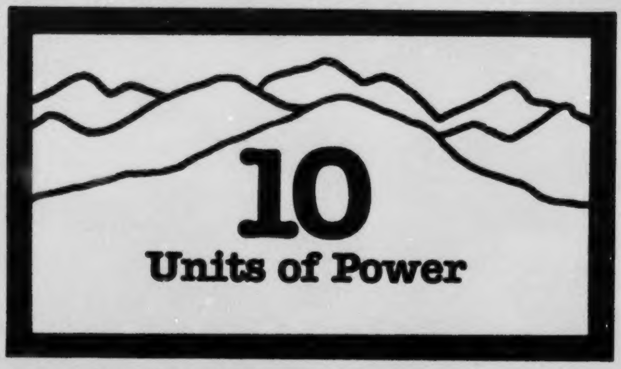
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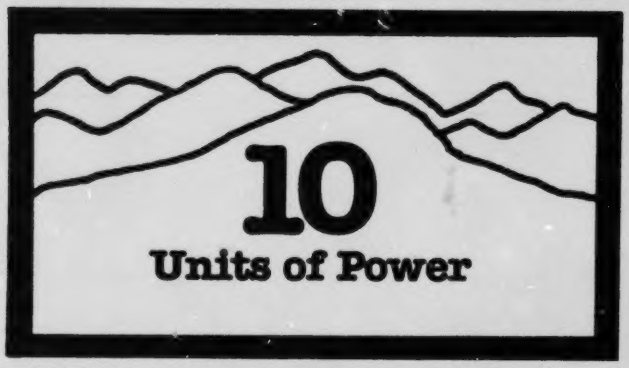
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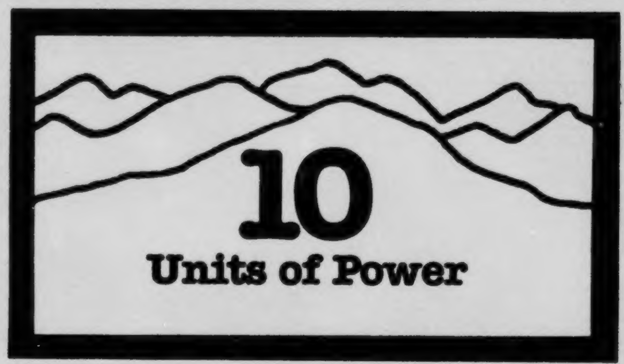
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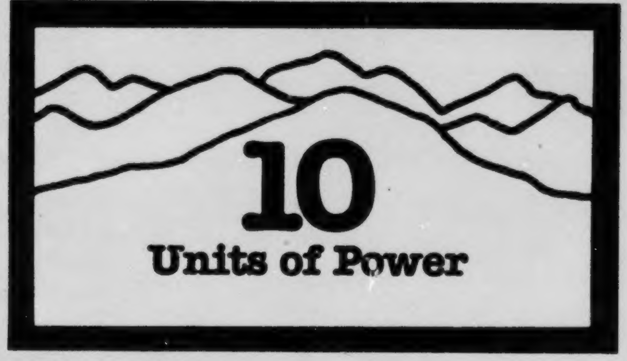
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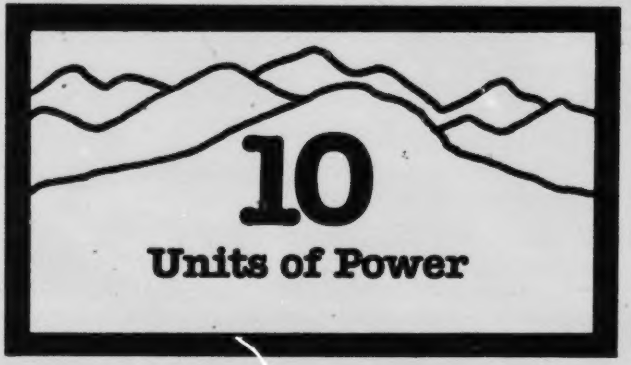
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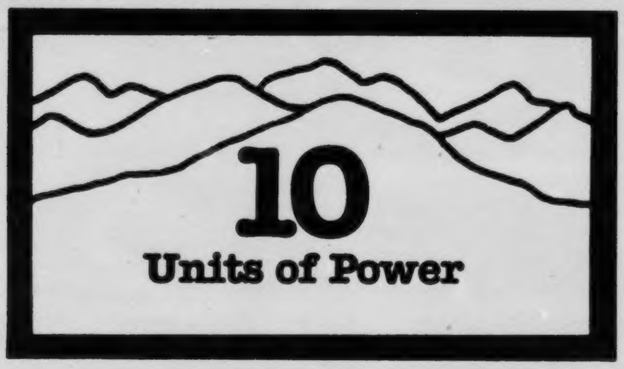
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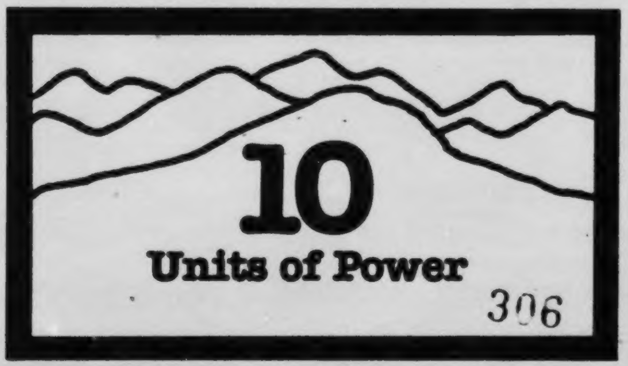
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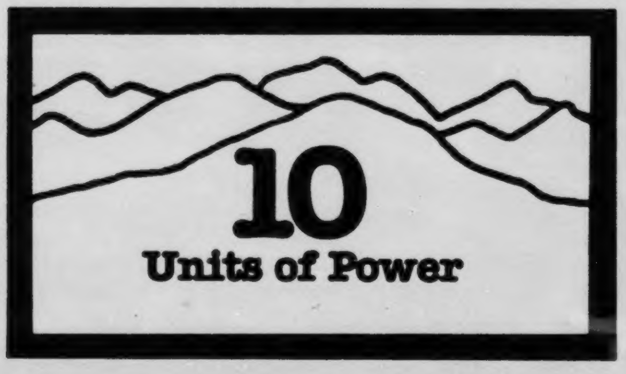
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## Follow-Up Activities

Just as each teacher will have his or her own reasons for electing to use Pisgah Simulation, so he or she will have individual ideas of where to go once the simulation is over. What follows are some suggestions of activities that may follow up on questions or concerns voiced while the simulation was propressing.

1. Discuss the "real world" interest groups that would be formed around some local land-use issue you and your students are concerned about. Invite a member of one or more of these interest groups to talk to your class.

2. Collect newspaper and magazine articles discussing the long range effects of the Mount St. Helen eruption on land use in Washington State. Discuss the options open to people whose land may be in an uncertain condition for many years to come.

3. Make up alternative plans for the development of a local area that may be in line for some change. Find out what various agencies (city planning office, regional planning commission, U.S. Soil Service, U.S. Forest Service, tax assessors) have to say about the suggested plans. See The Paving of New England for a more detailed treatment of this type of activity.

4. If an alternative plan (from No. 3 above) might include developing a hydroelectric plant, make a survey of the hydroelectric potential of the stream. See Waterwheels and Lumbermen for a guide to this activity.

5. If a mall or other commercial development is under consideration in your area, refer to The Paving of New England for an approach to the study of malls.

6. Plan a trip to Pisgah State Park.

7. There are other simulations relating to land use.

(a) Canalers and Conservationists: The Projected Cross-Florida Canal, by Edward Fernald; Neighborhood Response in Land Use Planning: A Role-Playing Game, by A. Rees Clark and Roman Cybriwsky; What Is All This Dam Foolishness, by Erwin Bill; and You Can't Sell Your Mother: Conflict Between The United States Government and The Sacne Nation, by Theodore Bond, Robert Dos Passos, Robert Miley, and Gregory Pierce. These simulations are part of the Instructional Activities Series of the National Council for Geographic Education.

(b) The Dead River. A simulalation game of river restoration by E. Nelson Swinerton, University of Wisconsin, Green Bay.
Kit is available from Union Printing Co., Inc., 17 West Washington St., Athens, Ohio 45701

(c) Gomston, a Polluted City. A simulation in ecology available from Ideal School Supply Co., Oak Lawn, Ill. 60453

(d) Integrating Man and Land. A land use simulation that is part of the Environmental Issues Series. It is available from Minnesota Environmental Sciences Foundation, Inc., 5400 Glenwood Avenue, Minneapolis, Minn. 55422.

(e) Possum Creek Valley. A simulation on environmental management. Available from Southern Forest Institute, 3395 Northeast Expressway, Suite 380, Atlanta, Georgia 30341

(f) Trade-off, the Land Use Planning Game. Trade-off players develop their own community in this simulation from Oregon State University Extension Service, Room 105 Extension Hall, Oregon State University, Corvalis, Oregon 97331

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Corsi, Richard, et. al. *Pisgah State Park Study and Plan*. Report to Worcester Polytechnic Institute, Worcester, Massachusetts, 1977.

Howe, Verne. *Land Use Controls and Local Government*. Four booklets describing the roles of various groups in land use decision making.
Available from Southern Vermont College, Bennington, Vermont 05401

*Land Book, The*. Office of Comprehensive Planning, Office of the Governor, State House Annex, Concord, New Hampshire 03301

Palmer, E. Lawrence and Fowler H. Seymore. *Fieldbook of Natural History*, Second Edition (New York: McGraw-Hill Book Co., 1975)

Steele, Frederick and Albion Hodgdon. *Trees and Shrubs of Northern New England*. (Concord, New Hampshire: Society for the Protection of New Hampshire Forests, 1971)

## LAND USE GAMES

City Planning: The Games of Human Settlement, by Forrest Wilson, 1975, Van Nostrand Reinhold Company, New York, New York.

The Dead River, by E. Nelson Swinerton, Union Printing Company, Athens, Ohio.

Eco-Acres. An Environmental Simulation, by Grace Papps, Maine Public Television, 1974, available from ERIC Document Reproduction Services.

Games/Interactive Learning Environments for Teaching Planning and Design Science.

Gomston, A Polluted City, Ideal School Supply Co., Oak Lawn, Illinois.

Homestead: A Simulation of Establishing a Frontier Farm and Community, by Jay Reese and John Wesley, 1974, Interact Company, Lakeside, California.

Indian Valley, by Norman Thomas, American Forest Institute.

A Land Use Simulation, Investigating Your Environment Series, 1978, Forest Service, United States Department of Agriculture, Washington, D.C.

Neighborhood Response in Land Use Planning: A Role-Playing Game, by A. Rees Clark and Roman A. Cybriwsky, 1975, Instructional Activities Series, National Council for Geographic Education.

Possum Creek Valley, by Southern Forest Institute, Atlanta, Georgia.

The Redwood Controversy, Houghton Mifflin Company, Boston, Massachusetts.

Trade-Off, The Land Use Planning Game, Oregon State University Extension Service, Corvalis, Oregon.

What Is All This Dam Foolishness? by Erwin Bill, 1975, Instructional Activities Series, National Center for Geographic Education.

Woodsy Owl's Forest Resources: A Game of Land Management.

You Can't Sell Your Mother: Conflict Between The United States and the Sacne Nation, by T. Bond, R. Dos Passos, R. Miley, and G. Pierce, 1975, Instructional Activities Series, National Council for Geographic Education.

# Paving of New England: Choosing Future Land Use

We have presented the units of this curriculum project in roughly chronological order - past, present and future land use. The activities in this final unit are designed to help students prepare themselves for intelligent involvement in land use issues arising in the future. There can be no doubt that controversies will break out in one community after another over the use to which a piece of land is to be put. Recognizing that we cannot anticipate every issue, we have used a two-pronged approach to the consideration of land use issues in general.

On the one hand a number of activities are described in this unit that illustrate the processes used in the study of any and all land use issues. And on the other hand to make the processes clear we have applied them to a real case - a specific proposal to build a mall in the City of Keene, New Hampshire.

The material relating to the Keene mall may serve (a) to illustrate the fact- or opinion-gathering, (b) to provide material for teaching a technique or process that a local issue has not yet generated, or (c) to serve to amplify a problem in land use decision making by providing an example. It is supplied here as typical of the type of material classes will find useful in the study of land use.

So that students will not be confused by frequent references to the Keene mall, the teacher will need to describe the situation that arose there:

Owners of a large tract of farm land desired to sell their land to a company that builds malls.

Before the company would buy the land, they needed assurances that the agricultural land would be rezoned by the city of Keene for commercial development.

The owners of the property requested the zoning change but the planning board opposed the change on the grounds that the master plan for the city called for the area to be converted to a residential area in the future.

Hearings were held and arguments for and against rezoning as well as for and against a mall being constructed on the land were heard. In the end the planning board recommended against rezoning, the city council voted to deny the zoning change, and the mall project as planned could not be carried out.

Too often teachers are discouraged by their students' lack of enthusiasm for social issues. To a large extent that apathy can be overcome by teachers who are themselves concerned participants in the controversy. Teachers who will accompany groups to hearings, meetings, agency offices, libraries, etc., and will top off the business with a bit of socializing can counteract foot-dragging effectively.

The title, The Paving of New England, sounds more negatively biased than the unit itself proves to be. We advocate that informed citizens should determine how land is developed (or not developed). To that end we have designed these activities to help students, the future voters, to understand what goes into land use decision making.

# Objectives

1. To help students recognize the part social forces play in land use decision making.

2. To help students apply scientific and technical information to a problem in land use.

3. To help students identify resources that can contribute information useful in making land use decisions.

4. To help students understand the function of public and private agencies in the land use decision making process.

5. To help students identify and clarify their own values with respect to land use.

6. To encourage students to become involved in an ongoing land use issue.

## Activities

It is the goal of the activities in this unit to serve as a guide to the study of a local land use issue. How these activities will serve your purpose depends to some extent on the issues available for study, and the interest level the controversy has reached. The activities and the background information on the Keene mall that are included stem from our firm conviction that schools have a responsibility to prepare young people to deal with land use issues as part of learning good citizenship.

Newspaper reports included with the unit will show that this bare outline of the facts does not do justice to the emotional and political aspects of the issue. Students will learn that the human responses to land use issues are major items to be taken into account.

The activities are grouped into four categories: Identifying the Issue, Fact Gathering, Opinion Gathering, and Putting It All Together. These are the ingredients in the intelligent investigation of any land use issue. With only slight modification, the activities can be applied to the land use issue occurring in your local area.

Activities grouped under Identifying the Issue will help teachers and students to isolate an appropriate issue to study and to grasp the extent to which the issue is clouded by the self-serving concerns of various factions. Fact Gathering guides students to sources of sociological and physical data vital to wise land use decisions. Opinion Gathering helps students identify interest groups and to assess the part value judgments play in land use decisions. Finally, Putting It All Together suggest ways in which students can become involved in the decision making process through simulation and genuine participation.

# Activity: Identifying the Issue

It may seem odd to devote time and space to the question, "What's the issue?" but, in fact, it is not always easy to define what is at stake in the consideration of the ways a piece of land may be used. For example, if an out-of-state contractor wants to bury asbestos in the local landfill, the issue may be (a) health - will asbestos threaten the safety of the people, (b) space - will the landfill be overloaded too soon, (c) economic - should private companies use public landfills?

A local land use issue may not be a suitable topic for a class project if (a) the issue is too new and vague, (b) too old and tiring to rehash again, or (c) too controversial in the opinion of school authorities or parent groups. "What's the issue?" becomes, "What's the best issue for my class to study in order to learn about land use?"

There may not be many options open to you. In a small community, land use issues are not always the current, burning question under discussion. In a large community there may be one big issue that dominates other land use problems. The aspects of a land use issue that will generate a lively class project are these:

(a) the issue has a fairly clear focus

(b) conflicting interest groups are clearly lined up on the issue

(c) the issue touches the citizens of the community in a direct way

(d) the issue clearly involves land use and not simply the economics or politics of the community.

A land use issue suitable for class discussion will undoubtedly be discussed in the local newspaper, be debated on "Open Mike" radio programs, or be the subject of open meetings and hearings. A teacher interested in seeing students become involved in a local land use issue needs to be alert to news of the community.

As an issue begins to appear in newspapers you will want to use the reports as background for the study. Even before you introduce the study in your class, begin to collect news items, editorials, letters to the editor, advertisements, etc. When you are ready to launch the study you may decide to read some of the articles to the class and/or post them on a bulletin board. You might assign them to individuals to read and discuss with the class.

Let us suppose that you have identified a land use issue worthy of your class' attention and study. How can you get your students involved? Here are some activities that might prove useful in this regard.

1. Word Association

Ask students to write down the first four or five words that come to mind on the subject of          . (Here you substitute a key word or phrase central to the land use issue: mall, interstate highway, landfill, industrial park, nuclear waste, etc.).

Ask students to write their words on a chart or the blackboard under one of two headings - "Positive" - "Negative" (avoid a neutral category). When the words are displayed for the class, discuss some of these questions. (a) Does the same word appear under both headings? Why is that? (b) What are the neutral (non-emotional words in either list? (c) What are the emotion-ladened words that appear in either list? (d) What might account for the emotion expressed on this issue?

2. Take a Stand

Place a strip of masking tape on the floor and mark it off with gradations of feeling toward the issue at hand (see Pisgah Land Use Simulation, p. 283 ). Ask students to stand on, or close to, their opinion. When the students are in place ask them to defend their positions. This technique can be extended to include more than one set of opinions. Provide for students to change their positions as the discussion of opinions progresses.

3. What Do You Know? What Have You Heard?

Students list in a manner visible to the class the bits of information they have gathered pertaining to the issue. Discuss these as to their foundation in fact or rumor.

# Activity: Fact Gathering

## Introduction

The next step after a class has decided to study a local land use issue (such as the Barrett proposal for a Mall in Keene) is the gathering of relevant facts. You might start with a current use description activity. Next information needs to be obtained about the physical aspects of the issue and finally information must be obtained about the social issues involved.

## Part A. Current Use Description

Obtain a map of the area under discussion. A map with a small scale such as a street map will be more useful than a large-scale, topographic map. The map should include the area within at least a half mile radius of the change in land use being considered. The map may be projected to increase its size for discussion and to become the background for an effective, on-going bulletin board.

Students inventory the area that is within the half mile radius of the focus of the issue. On the map indicate the current use of the land: (A color key is suggested.)

- agricultural areas
- residential areas
- schools and athletic fields
- businesses and industry
- stores and other commercial enterprises
- government services

On the map also indicate mileage to some of the more distant but major land use areas:

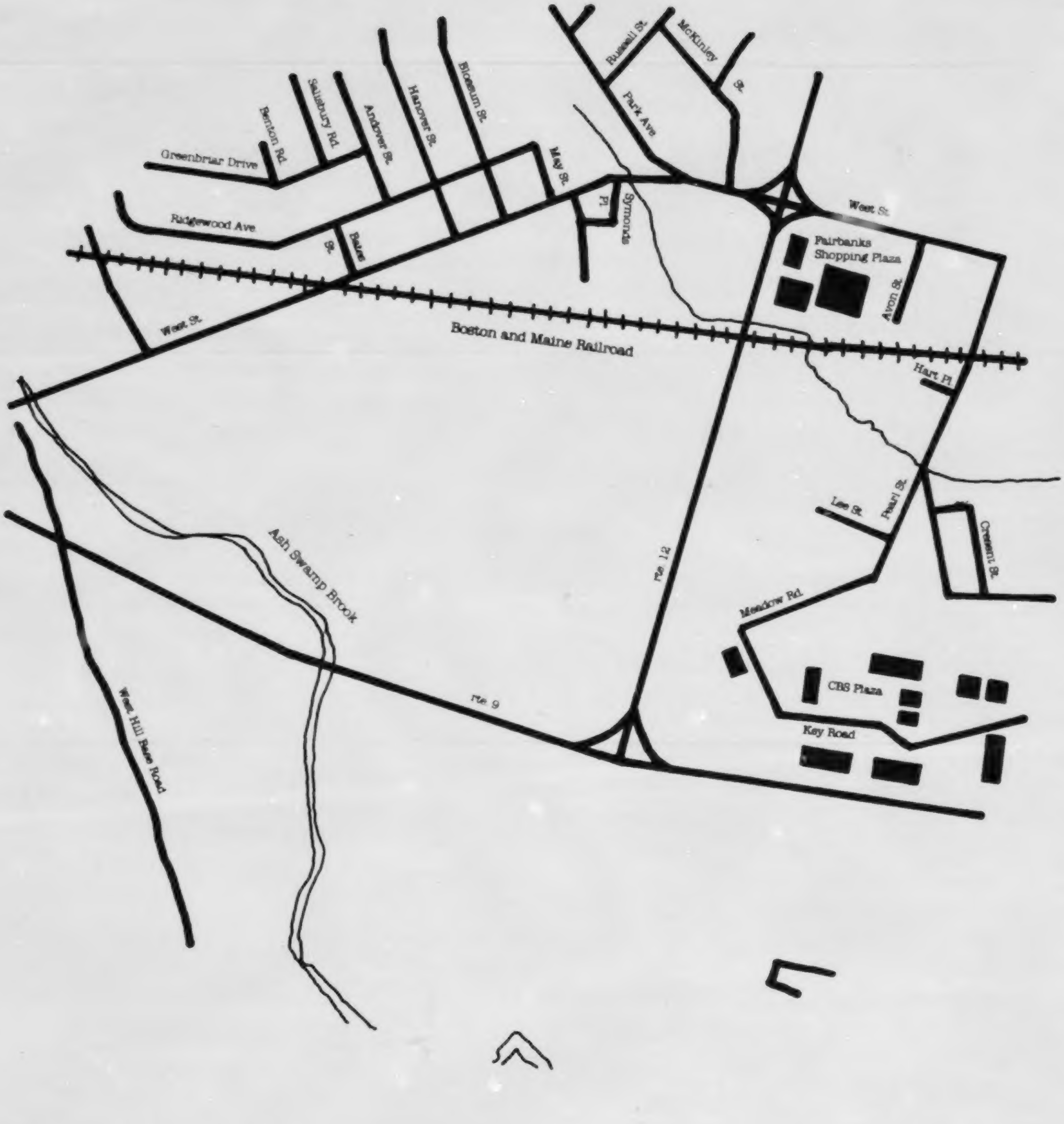
- airport
- interstate highway
- state park
- major lake or river
- other population or political centers - towns, cities or states.

The class should discuss the map they have produced. How could current use of this area best be described? (Reference may be made or even coordinated with the activity in Latham Cemetery Unit, p. 156 in which students are asked to list the changes they have witnessed in a particular area.)

In the case of the Keene Mall the Keene City Map (obtained from the Chamber of Commerce) was enlarged to show the area a half mile from the proposed mall site. Streets and highways were indicated, students drew in and color coded farm land, several degrees of residential intensity and the major business and commercial enterprises (see p.336).

# Keene Chamber of Commerce Map

**Keene, N.H.**
**Barrett Land**


Russell St.
McKinley St.
Park Ave
Blossum St.
Hanover St.
Andover St.
Salisbury Rd.
Benton Rd.
Greenbriar Drive
May St.
Pl.
Symonds
Ridgewood Ave
St.
Bates
West St.
West St.
Fairbanks Shopping Plaza
Avon St.
Boston and Maine Railroad
Hart Pl.
Lee St.
Pearl St.
Cresent St.
rte 12
Meadow Rd.
CBS Plaza
Key Road
Ash Swamp Brook
rte 9
West Hill Base Road

## Part B. Physical Aspects of the Issue

Students need to find physical data relating to the area. Students should draw up a list of topics for this information gathering. The list might include data about:

soil

water resources and flood plains

wild life

plant inventories

A list of resources students may need to use is included in this unit (Land Use and Environmental Agencies p.347). Students can learn much through their contact with these agencies. Maps that students will find useful in their discussion of a land use issue are topographic and soils maps.

Aerial photographs will also be of interest, though they take special skill to read accurately.

From the Keene Mall study we include one of these maps. (Keene Soil Survey Map.)

Examples of other kinds of physical and ecological maps will be found on p.309 of the Pisgah Land Use Simulation and on p.245 of the Winter Recreation Unit.

## Part C. Social Aspects of the Issue

In the study of a highly visible issue such as the Keene Mall the social aspects are complex and involved.

The newspaper clipping activity should continue on a daily basis. Several publications should be used where possible. "Facts" should be extracted from the newspapers and placed in categories such as economic facts, or political facts. Extract facts, not opinions, at this point and record the source of the "facts."

Business and commercial services can provide facts. For example, market analysis studies may be available through the Chamber of Commerce.

About the time the issue of the Keene Mall on the Barrett Land came to a decision, a downtown development group sponsored a conference. Various developers presented information about area populations, buying patterns and potential markets. The rehabilitation of old buildings, costs involved as compared to new construction, and government aid was discussed. A potential increase in revenue tax was suggested. (See Report on Governor's Conference on Downtown Revitalization p.342 ).

Finally, information of many kinds can be obtained from local, regional and state government offices. It is essential to learn all you can about the decision making process in your community. There are laws and regulations and procedures that control decision making; these vary from place to place. Students assigned to visit the office of the selectmen, mayor or town council (with specific well-phrased questions prepared ahead of time, of course) may turn up some valuable information. (See The Role of Government in Land Use Decision Making p. 344). For example, in the case of the Keene Mall, the City Planner provided information about:

zoning laws

variance granting

zoning and planning boards

public hearings

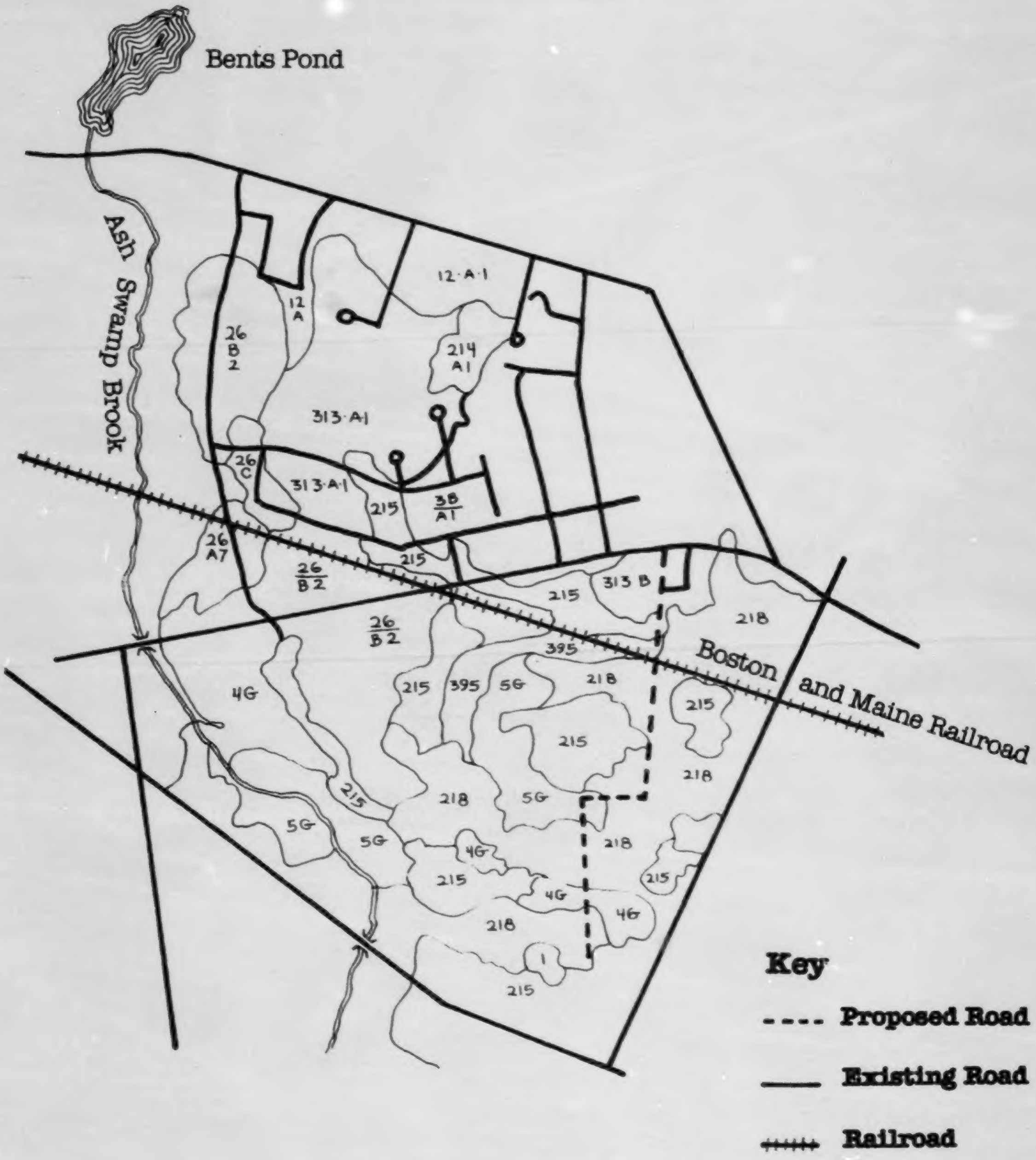
council members and operation of the city council.

He also provided an explanation of and the reasons for the city's master plan. In the case of Keene, the master plan map supplied both physical and social information. It shows where the existing flood plain is and it projects the types of development that should take place in Keene. (See Keene Master Plan p. 341 ).

Students should prepare questions for local government officials and be assigned to visit these people. Reports to the class should show just what the official point of view is on the local land use issue.

# City of Keene, N.H.
# Barrett Land Soil Survey

**USDA - Soil Government Service 1969**


Bents Pond
Ash Swamp Brook
12·A·1
12 A
26 B 2
214 A1
313·A1
26 C
313·A·1
215
38 A1
26 A7
26 B2
215
313 B
218
26 B2
395
Boston and Maine Railroad
4G
215
395
5G
218
215
215
218
215
218
5G
5G
5G
4G
218
215
4G
4G
215
218
1
215
Key
Proposed Road
Existing Road
Railroad

# Description of Soils in the Barrett Land

| SCS Number | Name | Description |
|---|---|---|
| 1 | Ondawa Fine Sandy loam | Ondawa is a flood plain soil usually found on flat terrain; it is flooded from adjacent streams at least once in every five years and is formed by the deposit of sand carried floodwaters. It poses severe limitations to all development. |
| 4 G | Podunk Variant Fine Sandy loam | These are moderately well drained soils that formed in sandy floodwater deposits. The top four feet is composed of fine sandy loam, while below is gravelly sand. These soils are found on flat terrain and are frequently flooded. Severe limitations are posed to all development. |
| 5 G | Rumney Variant Fine Sandy loam | Poorly drained soils formed in thick alluvial deposits along streams. The flood hazard is severe, and so the limitation to development is severe. |
| 12 | Hinckley Loamy Sand | Excessively drained soils formed in thick deposits of sand and gravel. Below four feet, the material is well stratified into sand, gravel, and cobbles. Found on terraces, outwash plains, kames, and eskers. High value as road material but unsuited for agriculture. Often unstable if developed on moderate slopes; on flat terrain limitation to development is slight but care must be taken that septic systems do not pollute nearby wells, streams, and lakes. |

| SCS Number | Name | Description |
|---|---|---|
| 26 | Windsor Loamy Sand | These are excessively drained soils that formed in thick deposits of sand; they occupy terraces, outwash plains, and deltas and can be found in a great variety of slopes. Their use for agriculture is severely limited due to the prevailing droughty condition. Bedrock is often at very deep levels. |
| 218 | Raynham Fine Sandy Loam | These are poorly drained soils in their flooded phase that formed in very fine sand and silt deposits. They are often found in depressions on low terraces or lake plains and are subject to flooding. Their use is severely limited by their poor permeability. |
| 215 | Wareham Fine Sandy Loam | Poorly drained soils formed mainly in thick sand deposits. Subject to flooding from adjacent streams. Like Raynham, poor permeability limits all uses of this soil. |
| 214 | Au Gres Loamy Sand | Poorly drained soils formed in thick deposits of sand, generally occupy outwash plains. |
| 313 | Deerfield Loamy Sand or loamy fine sand | Moderately well drained soils formed in thick deposits of sand, occupy outwash plains and terraces. May differ in use depending upon the amount of sand or loam. |

# Report on Governor's Conference on Downtown Revitalization
## Keene Workshop, Wed. Feb. 13, 1980

Co-sponsors of this conference were -

- Governor's Office
- Townscape Coalition
- New Hampshire Preservation Office
- New Hampshire Office of State Planning
- Keene Downtown Development Incorporated
- The Greater Keene Chamber of Commerce
- Keene City Council

Location -

The Conference was held in two locations, both old industrial buildings, close to the center of downtown Keene, New Hampshire.

Speakers -

- Developers
- Local business people
- Business people from other cities
- Financial people
- Government representatives (a Community Development Director)

Background -

As part of Keene's Master Plan a gradual revitalization of the downtown area is projected. During the time rezoning for a mall was being publically debated several groups were actively advocating implementing part of the downtown redevelopment. Specifically, this was a plan to build an "East Side Beltway" eliminating some of the old railroad tracks and opening the downtown area to increased commercial development.

MAP AND DESCRIPTION OF THE CITY OF KEENE, N.H.
REMOVED DUE TO OVERSIZE.

This is a summary of the points made at the Conference -

1. There are 200,000 people in the region from Claremont, New Hampshire to Greenfield, Massachusetts. They spend $167,000,000 in this region. They spend $40,000,000 outside this region. If only half that amount remained in the area, it would have a multiplying effect on the area's economy.

Transportation costs are rising making local commercial sites more attractive and economical. (A developer).

2. If there is to be a shopping center built, it should be in the center of Keene where county government and the college community exist and where major highways converge. It should be an interesting place reflecting more than commercial interests. It should include entertainment, cultural events, and specialty shops for sophisticated shoppers. (A developer and governmental advisor).

3. In cities where a suburban mall has been built (such as Manchester, New Hampshire), it takes approximately eight years for the center of the city to recover economically. Often recovery can occur only after a revitalization of the downtown area has been completed. (Governmental advisor).

4. It is economically advantageous to rehabilitate existing buildings. It is also esthetically pleasing. (Local banker and local builder).

5. To revitalize a downtown area requires a great deal of commitment by all local interests as well as cooperation and support from governmental agencies and banking interests. (Banker and governmental advisor).

6. Careful planning is essential. Sensitivity to the history of the city, to the various architectural styles and to the image the community has of itself is particularly important. The interests and needs of all its citizens must be considered. (Architect).

7. In areas where revitalization (such as Portsmouth, New Hampshire) has taken place the results show not only an increase in business but also an increase in tax base, decrease in vandalism, and general pride and optimism of both merchants and citizens. (Portsmouth restauranteur).

# The Role of Government in Land Use Decision Making

Who makes land use decisions anyway? This question leads to the basic philosophical question that has challenged Americans since the first European settlers arrived. Our history is replete with the conflict between the individuals rights regarding his or her private property and the communities right to carry out the majority will. When one of these three groups, private property owners, government officials or citizens do not act, that in itself is a decision to let the other groups do the decision making.

In practical terms it is necessary when studying any land use decision to find out specifically what role the government will play in the final outcome. Here are some questions to be answered:

1. What level of government - local, regional, state or national - a combination or none - has jurisdiction over the decision?

2. What statutes or government administrators are involved?

3. What sequence of actions must be followed by the decision makers?

4. What role can public opinion play and how may it be effectively expressed?

We have provided a broad list of agencies, government bodies, environmental groups that are involved in Land Use Decisions. Consult those you find appropriate for your local issue.

In the Keene Mall issue the City Planning Board recommended that the Barrett land not be rezoned. Then a Public Hearing was held by the City Council. The City Council, by majority vote, made the final decision. But it was interesting to note that the appeal of the proponents of the mall was not just that such a mall would be beneficial to the community but also that an individual property owner has rights in land use. As Toby Barrett said: "I believe we have a right to do this, under a free enterprise system of government." (Keene Sentinel, March 21, 1980).

# Government Officers and Offices in Land Use Decision Making

Mayor - elected by and representative of a city. Depending on the city charter his or her powers may be advisory or decisive. City leadership - ceremonial and actual is the role of the mayor.

City Council - a group elected by citizens of a city. The City Manager (if there is one) is hired by and can be removed by the Council. Final authority for city ordinances, taxes, administration is with the members of the City Council.

City Manager - appointed and is responsible for the administration of the various city departments: safety, public works, transportation, health, etc.

City Planner - part of the city administration under the city manager and by whom the ideas of the Council are translated into specific plans or an overall plan known as a Master Plan.

Boards of Selectpersons - Advises Planning Board. Historically, three in number, elected by citizens of a town. Provide leadership in drawing up a budget and administration of the decisions of the Town Meeting.

Town Manager - Same role as City Manager but is hired and is responsible to the three Selectpersons. The Town Meeting establishes the office of Manager and may revoke their decision.

Planning Board - appointed by elected representatives of a city or town regulates all land development.

Zoning Board of Adjustment - hears, then grants or rejects requests for variances (exceptions) to the land-use zones set up by the governmental authority.

Regional Planning Commissions or County Planning Departments responsible for research and leadership in developing area wide plans for transportation, industry, commerce, housing and increasingly, energy. Recommendations go to local, county, state, and federal officials.

County Cooperative Extension Service - provides specialists to assist in agriculture, forest management, home economics.

State Legislatures and State Administration - may play a large part in land use decision making, particularly in the case of Vermont which has enacted a comprehensive Land Use and Development Law, known as Act 250.

The Agency for Environmental Conservation, State of Vermont - charged with maintaining state forests, parks and bodies of water. Responsible for regulation of development of land under Vermont's Act 250. Regional offices review major land development proposals to determine whether or not they will negatively affect either the soil, water quality or the ability of local towns to absorb developments.

Soil Conservation Service - part of U.S. Department of Agriculture, determines what soils exist in any given area, and advises farmers, developers, and other land owners on appropriate land use. Active in public education.

Agricultural Conservation and Stabilization Service - also part of the U.S. Department of Agriculture, works closely with SCS. Advises and financially assists in soil conservation.

Resource Conservation and Development Office - also part of U.S. Department of Agriculture - provide technical assistance in conservation and utilization of natural resources.

United States Army Corps of Engineers - is responsible under direction of the U.S. Congress, for maintaining navigable waters and protecting citizens from natural disasters such as floods.

Environmental Protection Agency - Federal agency responsible for enforcement of laws related to clean air and clear water standards.

Historic Commissions - set up by U.S. Congress, provide help in maintaining historic building and historic areas.

*(This is only a partial list. Student research will add more.)*

# Land Use and Environmental Agencies in the Tri-State Area

## Cheshire County

Southwestern New Hampshire
Regional Planning Commission
40 Mechanic Street
Keene, New Hampshire
(603) 357-0557

Soil Conservation Service
Federal Building
Main Street
Keene, New Hampshire
(603) 352-2764

Agricultural Conservation &
Stabilization Service
Federal Building
Main Street
Keene, New Hampshire
(603) 352-2764

Cheshire County Cooperative
Extension Service
800 Park Street
Keene, New Hampshire
(603) 352-4550

Monadnock State Park
Jaffrey Center,
New Hampshire
(603) 532-8862

New Hampshire Fish Hatchery
Richmond, New Hampshire
(603) 239-4810

Society for the Protection
of New Hampshire's Forests
Concord, New Hampshire

## Windham County

Windham Regional Planning
& Development Commission
139 Main Street
Brattleboro, Vermont
(802) 257-4547

Windham County Cooperative
Extension Service
4 High Street
Brattleboro, Vermont
(802) 257-7967

Agricultural Conservation &
Stabilization Commission
Federal Building
204 Main Street
Brattleboro, Vermont
(802) 254-9766

Soil Conservation Service
Federal Building
204 Main Street
Brattleboro, Vermont
(802) 254-5323

Vermont State Environmental
Conservation Agency
Regional Office
363 River Street
North Springfield, Vermont
(802) 886-2215

Main Number connects with:
- Act 250 Environmental Review Board
- Fish & Game Biologists
- Forests, Parks, and Recreation

## Franklin County

Franklin County Extension
Service
425 Main Street
Greenfield, Massachusetts
(413) 774-2902

Franklin County Planning
Department
425 Main Street
Greenfield, Massachusetts
(413) 774-3167

Agricultural Conservation &
Stabilization Commission
62 Federal Street
Greenfield, Massachusetts
(413) 772-6810

Soil Conservation Service
4 Whalley Street
Hadley, Massachusetts
(413) 586-5440

Resource Conservation &
Development Office
Amherst Road
Sunderland, Massachusetts
(413) 665-7040

Massachusetts Natural Resources Department
Mohawk Trail State Forest
Charlemont, Massachusetts
(413) 339-5504

## Activity: Opinion Gathering

### Introduction

Land use issues are made complex because opinions become polarized quickly and easily. It is now, however, always easy to spot the various opinions, and students should have practice in doing so. If you have selected an issue and there has been a newspaper report on at least one public hearing, students may be able to identify the opinions and the groups that hold them by reading the report carefully.

### Part A - Identifying Interest Groups From A Newspaper Report

As an illustration, one such report appearing in the Keene Sentinel, February 12, 1980, is reproduced (p.353 ) and guide questions are supplied (p. 360).

### Part B - Polling Techniques

Students may conduct an opinion poll. They should carefully construct the questions they will use in the poll.

The questions should provide useful information. The first consideration is to determine exactly what it is the class wants to find out. Then the questions are designed to answer the basic inquiry. The following are additional criteria for the questions:

a. The question must be clear:

Good - Do you favor the construction of a mall on the Barrett lands?

Poor - Do you enjoy shopping in a mall?

b. The questions must be unbiased.

Good - Should the Keene City Council change the zoning of the Barrett land from agricultural to commercial?

Poor - Should one of the last pieces of farm land in Keene be taken for another shopping area?

The group that is to be polled must be carefully selected and identified. Shoppers at a plaza will give one set of answers, high school students may give other sets of answers. It is possible to make fairly accurate conclusions if the poll is conducted by carefully sampling a random selection of people. Sampling is based on the probability theory.

The validity of the results is only as valid as the sample.

A good sampling technique: A telephone poll is conducted. From the telephone book every twenty-fifth name is selected. The questions are asked of one adult in the household. The calls are made between 6 P.M. and 8 P.M.

A poor sampling technique:

A talk show solicits callers to express their opinions on an issue.

The technique used in polling must accompany the results. Any conclusions based on the polling must relate only to the information obtained. Even then polling itself must be questioned, but the technique can be an interesting exercise for a class. Sometimes a civic group will enlist high school aged pollsters. Students who are involved not only learn but they serve their community as well.

A political science, sociology, or introductory psychology textbook will contain further information about designing polls.

### Part C. Identifying Opinions Held By Interest Groups

When it has been possible to identify the interest groups and their spokespersons, try to arrange to have speakers come to your class. If speakers on opposing sides can be heard, so much the better. Depending on the level of antagonism, two or more speakers might be willing to face each other in your class. Students should be prepared with questions. The speakers will provide an excellent opportunity for listeners to practice separating fact from opinion. (See Summary of Two Position on the Keene Mall Issue p.361 ).

One or more of these procedures should help students isolate interest groups and their opinions. In the process, the issue should become clear to students. It should be a primary goal of these activities to make land use issues clearer to students. As an example of a complex issue, consider the Keene mall case.

The official question was whether or not to rezone agricultural land for commercial use. More fundamental questions were raised about the viability of city planning, the various prejudices of government officials, the economic self interest of downtown merchants, and local industries' interest in the labor market. At another level, the issue illustrates the classic controversy over the rights of an individual (the Barrett's right to do with their private property what they wish) believing that the mall will not hurt the general good and the rights of the group (as expressed by various interests) who believe that the mall is not in the interest of the general good.

### Part D. The Mall Questionnaire

The only way a private citizen or group can counterbalance authority invested in elected or appointed agencies is to solicit public support. In any land use issue attempts will be made to persuade the public to believe in the causes of various groups. One way to call attention to an issue is to ask the citizens for their opinions on the matter.

In the Keene mall case, just such an effort was made by the Barretts, owners of the land in question. As an exercise in assessing opinion gathering techniques, the poll conducted by the Barretts is reproduced below just as it appeared in the Keene Shopper News and the Keene Sentinel. Questions for discussion accompany the paid advertisement (see p. 366).

It is worth mentioning here as a case in point of organizational effectiveness that the Barretts, respected citizens of Keene, went so far in their efforts to persuade the public to their point of view as to establish a local office. Here maps of the area were on display showing the proposed mall site, printed material was distributed, and the Barretts themselves were on hand to answer questions. Certainly if such offices are set up in your area you will want students to visit them and hear how the case is presented.

# *Mall Would Benefit City, Backers Say; Keene Planning Board Isn't So Sure*

**By RICK MINARD**
**Sentinel Staff Writer**

A 300,000-square-foot enclosed shopping mall proposed in West Keene would be good for Keene and its taxpayers, developers told the Keene Planning Board Monday night.

However, planning board Chairman George M. Rossiter noted that all plans made for Keene's future would reject commercial development on the proposed mall site, which is now a cornfield.

Conceptual plans for the 40-store mall were presented Monday by Aubrey W. "Toby" Barrett of East Surry Road, his attorney, Homer S. Bradley Jr., and a New Jersey developer. Barrett and his brother, Ellis E. Barrett, own the potential mall site.

The Barretts have asked the Keene City Council to rezone 68 acres of the 75-acre parcel they own for commercial development. The land is adjacent to Route 12, bounded on the north by West Street and on the south by Route 9; it's now zoned agricultural.

The planning board will send the council a recommendation on the rezoning request after discussing it Feb. 25.

Robert Broglia, vice president-development for Interstate Properties of Clifton, N.J., said his firm wants to build the mall. It has built and owns several other malls and strip developments in places from Michigan to Connecticut, he said.

The mall planned for the Barrett land would include about 300,000 square feet of enclosed store space, including three large department stores of between 40,000 and 71,649 square feet. Smaller shops would occupy about 140,000 square feet, Broglia said.

Broglia said he became interested in Keene after talking with department store executives who worked with Eastbay Development Co. of Reading, Mass., on plans for a Keene mall which the city government rejected last year.

Interstate Properties has not conducted any market surveys of the area, Broglia said; rather, it relies on surveys conducted by individual stores and the gut feelings of its own executives.

"You don't need to be a genius or an expert to tell if a town needs a shopping center or not," Broglia said.

At least four major retail stores would like to locate in Keene, Broglia said. Broglia said he works with J.C. Penney, Filene's, Jordan Marsh, K-Mart and Sage Allen, but stressed that no commitments can be made until mall plans are approved, and no specific tenants can be promised at this point.

The Keene mall would be profitable, Broglia said, drawing customers from the immediate area and from Massachusetts and Vermont. The mall would eliminate the need for local shoppers to travel to malls in Manchester, Hadley, Mass., or Albany, N.Y., he said.

Toby Barrett used maps to argue that the site is a good one for a mall. If land around the mall site is developed for medium-density housing, there will still be a buffer between the mall and a single-family housing area off West Street, he said.

Bradley said the land should be rezoned because it's too wet and heavy to be good farmland, and because Keene needs more commercial property.

The developers plan to build a four-lane, divided highway as the mall entrance; it would connect with Route 9 west of Ash Swamp Brook, and serve new headquarters planned for the N.H. State Police and the N.H. Division of Motor Vehicles. The developers would also build an intersection where roads leading to the mall and to Keats Inc., across the highway, meet Route 9, and would pay for a traffic light, Bradley said.

The new road would ring the mall, and could be extended to nearby farmland which lacks good access now, Bradley said.

City sewer and water lines are already available to the mall site, Bradley said, and because mall traffic would enter and exit on Route 9, there would be no traffic problem on Keene streets.

"We don't believe a mall in this area would hurt the downtown," Bradley said. "In fact, it might be very helpful for it."

The mall is expected to be valued at $6 million to $8 million.

Planning board members asked relatively few questions Monday night, but those had a negative tone.

Mayor Richard P. Peloquin argued against Barrett's claim that the site is too wet for housing, saying apartments don't need cellars, and noting that Cheshire Homes and other apartments across Route 12 are built on land just like Barrett's land.

Alfred H. Merrifield, city health director, said the city's long-range plans show the Barrett property as medium-density residential. Since the plan is supposed to assure balance among commercial, industrial and residential uses, if the Barretts' 68 acres of residential land were developed commercially, some residential land would have to be added elsewhere, he said.

Merrifield asked Bradley where that land would come from. Bradley said he didn't know, but added, "This isn't very desirable for houses."

Board member Robert F. Irwin suggested that the board ask for a detailed site plan before it votes on a zoning recommendation.

However, Rossiter said the issue should be decided as a general matter of zoning; asking for a site plan would force the developers to spend money that might be wasted.

Everything in the city's land use plan, community goals and zoning map "would say that that land is not intended for commercial use," Rossiter said, and the city government has generally opposed commercial development outside its highway bypass system.

# Keene Board Opposes Rezoning for Mall Site

By GEORGE MANLOVE
Sentinel Staff Writer

Plans for a 300,000-square-foot shopping mall in West Keene may have hit a major stumbling block Monday night.

The Keene Planning Board voted 7-1 Monday to recommend that the mall site — now a 68-acre cornfield — not be rezoned from agricultural to commercial. The landowners, Ellis E. and Aubrey W. "Toby" Barrett of East Surry Road, Keene, requested the zoning change to permit the mall development.

However, the planning board vote is not the final word on the rezoning issue; it's only a recommendation to the Keene City Council. The council will hold a public hearing on the rezoning request March 20, and then decide the issue.

In opposing the zoning change, board members cited Keene's land use plan, which says the prospective mall site should be used eventually for housing. The land is adjacent to Route 12, near the broadcasting tower of radio station WKBK, and is bounded by West Street to the north and Route 9 to the south.

Toby Barrett and his attorney, Homer S. Bradley Jr. of Keene, tried unsuccessfully to convince board members that the land use plan should not be followed in this case. They said other Keene land is better suited for housing, but there's little land available for substantial commercial development.

After the board voted against rezoning, Barrett indignantly tore up a copy of the land use plan and tossed the pieces at Mayor Richard P. Peloquin, who had made the motion to turn down the request.

"Here's your land use plan," Barrett said disgustedly. Peloquin didn't say anything, but flung the pieces of paper back at Barrett.

Earlier, Barrett and Bradley argued that Keene will be better off if the Barrett land is developed comercially, rather than for housing.

With a completed mall, Barrett said, the property will return $325,000 a year in taxes — more than the city government could hope for from apartments or other types of housing.

Bradley assailed city plans that say no commercial development should be allowed now outside Keene's highway bypass system.

"I don't think it's right, and I even question if it's legal," Bradley said, "but I know that it isn't good for the city of Keene, particularly for the residential homeowners."

In effect, he said, the planning board is saying that the downtown area is the only place in the entire community where major commercial developments are allowed.

"You're creating a monopoly for the downtown merchants that I don't think is good for the town, and I don't even think is good for the downtown merchants, by refusing to rezone any land in the city where a commercial enterprise can come in and build and increase our tax base," Bradley said.

Generally, city officials want to see development on commercially zoned land within the bypass perimeter before allowing new commercial areas elsewhere, and City Planner Jerry F. McCollough reiterated that position Monday.

Bradley challenged the board to show him a commercially zoned site large enough for a major commercial development.

If the land were rezoned, Peloquin argued, the balance of residential, commercial, industrial, recreation and other zones would be tipped.

Voted to recommend that rezoning be denied were George Morin, Everett P. Alther, Susan F. Wirths, George M. Rossiter, Alfred H. Merrifield, Peloquin and David R. Meader. Robert F. Irwin opposed the recommendation, and Mark Russell was absent.

A Portsmouth real estate agent, Richard Mycko, holds an option to buy the Barrett property; Interstate Properties of Clifton, N.J., would build the mall if city permits were obtained.

# Large Crowd Gathers to Support Rezoning for New Shopping Mall

By GEORGE MANLOVE
Sentinel Staff Writer

A 68-acre section of a cornfield in West Keene is a good place for a 300,000-square-foot shopping mall, proponents of a mall plan argued Thursday night at a public hearing in Keene.

The agricultural land should be rezoned to allow commercial use, they said, in the spirit of free enterprise and democracy. A mall will generate enough property taxes to reduce increases in city property tax bills, they said.

But those who oppose rezoning the land, owned by Aubrey W. "Toby" and Ellis E. Barrett of Keene, said a mall on the site will erode the quality of life in Keene and will draw the economic life out of downtown Keene.

The Keene City Council held the hearing to gauge public sentiment on the question of whether to rezone the Barretts' land. Councilors will decide soon whether to rezone the land, as requested by Barretts, who would sell the property to a development firm, Interstate Properties Inc. of Clifton, N.J.

Between 120 and 150 people from Keene and several area towns turned out Thursday; city officials had to move the hearing from City Hall to larger quarters at Keene Junior High School.

Most people seemed to favor plans for the mall.

Twenty-one people urged the council to approve rezoning, 12 spoke against it, and nine people, including several city councilors and Mayor Richard P. Peloquin, just asked questions.

The Barrett property is located in West Keene, bordered by West Street to the north, by Route 12 to the east and Route 9 to the south.

After the 2½-hour hearing, the council voted to postpone its regular meeting until Wednesday night.

At the hearing, Toby Barrett presented the council with a box of 950 "ballots," which he said support the building of a "quality" mall in Keene by a three-to-one ratio.

Urging the council to approve rezoning, Barrett said he wants to "produce a competetive business that is aesthetically pleasing."

"I believe we have a right to do this," he said, "under a free enterprise system of government.

"Is it a legitimate reason to turn down one business or a man who wants to go into business simply because it might hurt another business that's competitive?

"We are asking the city council, ladies and gentlemen, for an opportunity, purely and simply, to engage our land in its highest and best use, as dictated by the trends of the times," Barrett said.

Portsmouth real estate agent Richard J. Mycko, who represents Interstate Properties, said the proposed mall would complement downtown Keene, not destroy it by taking away business.

"There will be a mall built in this area," Mycko warned, "whether it be in Keene or in Swanzey or in Chesterfield, one will happen."

**Mall Developer**

Richard J. Mycko of Portsmouth defends plans for mall off Route 9 in West Keene.

The mall he proposes would contain three "quality" stores, Mycko said, naming J.C. Penney, Sears and Jordan Marsh as stores with which he's been in constant contact.

Although no major department store will commit itself to a proposed mall unless it's 95-percent sure to be built, Mycko said, he's also courted other prospective mall tenents, such as Filene's, K-Mart and Marshalls.

Three department stores would each occupy between 40,000 and 71,649 square feet, while smaller shops would occupy about 140,000 square feet.

Asked about the chance of Sears being one of the three anchors, Mycko said, "I'll go out on a limb and say you would get a full-fledged store."

Currently, Sears has a store and catalog sales office at 41 Central Square.

When Mycko named Jordan Marsh as a store which might come to Keene if a mall is built, Peloquin asked him crisply, "Where is there a city of this size that has a Jordan Marsh?"

There are none, Mycko admitted. "But J.C. Penney has a desire to be in the Keene area," he said.

Rezoning for the mall has been opposed by the Keene Planning Board, which voted 7-1 several weeks ago to recommend denial of the request.

City Planning Director Jerry F. McCollough said Thursday that the planning board and the city planning department oppose commercial use of that land because the city's land use plan and community goals call for medium or high-density housing on the property.

Joseph A. Baute of 50 Acrebrook Road opposed the rezoning request. He said the focus of the debate at the hearing on malls is "putting the cart before the horse."

The issue is rezoning and land use, he said, holding up a copy of the city's land use plan. The integrity of the plan is damaged every time city planners deviate from it, he said. Too many decisions are made in Washington, in Concord and even in Keene on the basis of concessions to special interest groups, according to Baute.

"We have an opportunity here, an obligation," Baute said, "to live up to the (land use) plan."

But Barrett and his lawyer, Homer S. Bradley Jr. of Keene, argued that the land is better suited for commercial use, not residential.

Bradley said only 11 acres of commercially-zoned land are available in the city for future commercial growth. There is no place for a commercial developer to build, he said, noting that plenty of land is available for future residential and industrial use.

Developers shouldn't have to beg for rezoning of land to build; "The land use plan is not written in stone," Bradley said.

"It's time for the city to stop worrying about protecting the downtown and start thinking about the community as a whole," he said.

"This type of enclosed shopping mall is what's going on right now."

Productive farmland and hay fields were fine 28 years ago, said Henry D. Duhaime of 120 Adams St., but vehicles these days aren't drawn by horses.

"Things have changed, that's all gone to pot," he said, urging the council to rezone the land to allow revenue-producing stores on the site.

However, several residents told of abandoned downtown areas in other cities, where storefront windows are boarded up and crime has increased because regional malls have created economic disaster downtown.

Diane Stradling of 43 Franklin St. said downtown Manchester "looks like it's been through a war," since the Mall of New Hampshire was built on the outskirts of the Queen City.

Other mall opponents said they moved to Keene to get away from malls elsewhere in the country.

But many long-time residents said the city needs a mall to provide tax relief and to save money on the gasoline they must use to get to the Manchester mall for their shopping.

Others wondered if high gasoline prices will prevent people from traveling long distances to get to a mall in Keene.

Mycko said the mall he proposes would draw 80,000 to 100,000 shoppers from Massachusetts, Vermont and elsewhere in New Hampshire.

Tom Judd of Winchester said he supports the mall if it would draw Massachusetts residents through Winchester to get to Keene. That would improve beer and cigarette sales in Winchester, he said.

# Councilors Lean Against Rezoning Land for Mall

By GEORGE MANLOVE
Sentinel Staff Writer

If the Keene City Council voted today, it would probably refuse to rezone 68 acres of cornfields in West Keene for a shopping mall.

The council is expected to vote on the issue one week from today.

At least five of the council's 15 members told The Sentinel they will vote against rezoning the land, owned by Ellis E. and Aubrey W. "Toby" Barrett of Keene. Three more councilors — which would be a majority — are leaning that way.

Four councilors said they haven't decided or aren't ready to announce how they'll vote.

One councilor is leaning toward rezoning, and one councilor, Terry A. Bishop of Ward 1, said flatly he will vote for rezoning; he believes a mall would benefit Keene's property-tax base. The 15th councilor, Barbara B. Battenfeld, is in California this week.

The Barrett property is off the Route 12 bypass in West Keene, bordered by West Street to the north and Route 9 to the south. It is zoned for agriculture; the Barretts have asked the city council rezone it for commercial use, so they can sell the land to Interstate Properties of Clifton, N.J.

That company plans to build a 300,000-square-foot shopping mall.

Many councilors said they don't believe statements made by Richard J. Mycko, a Portsmouth real estate agent who represents Interstate Properties. Some councilors' opposition to rezoning is tied directly to Mycko and the major stores proposed for the mall; others feel Mycko's plan is acceptable, but rezoning the land is not.

Several councilors objected to presentations by Mycko and the Barretts' attorney, Homer S. Bradley of Keene, who said the mall would produce about $325,000 a year in property taxes for the city treasury. They also said "anchor" stores such as Filene's, Jordan Marsh, Sears Roebuck, J.C. Penney and K-Mart are being considered for the project.

Councilor Robert F. Wilber said he believes Mycko "lied to us" about which stores are the most likely mall tenants.

Councilor Gordon S. McCollester said Mycko's presentation at a public hearing last week was "shoddy."

Wilber, McCollester, James A. Putnam and Lawrence G. Wilson said they believe a regional shopping mall on Keene's outskirts will siphon business out of the downtown area.

"What taxes could be gained at the mall would be lost downtown," Wilber said.

"Show me a community where it (a suburban mall) hasn't affected the community adversely, and I'll vote for it," Wilson said. As for the argument that a mall will aid Keene overall, he said, "I just don't believe it."

Putnam, while leaning against the mall and rezoning, said he is still open to new arguments.

Councilors Robert E. Williams and Timothy N. Robertson oppose rezoning, and Paul T. Cavanaugh is leaning that way. Councilor David R. Meader said he'll probably oppose rezoning because Keene needs better commercial development downtown.

Most councilors say the issue is not strictly a question of land use, as mall proponents argue. There's too much at stake to define the issue so narrowly, a majority of councilors said, because the rezoning decision will have a lasting effect on the community.

Councilor Michael E.J. Blastos is leaning toward voting for rezoning, and said the mall and the types of businesses proposed there shouldn't figure into the rezoning vote.

"I would not vote on the mall issue. I would vote strictly on land use," Blastos said.

Once the city government decides how the land should be used, it's up to the landowner and developer to pick stores for the property, Blastos said. That's part of the free-enterprise system.

Councilor Ruth R. MacPhail, on the other hand, says the issue isn't a question of land use, but whether Keene needs a regional shopping mall.

"The land is no good anyway," she said, because it's "mucky and sandy. I mean, they can't use it for anything, they can't plant anything. Why not put a mall in?"

Mrs. MacPhail noted that the state government plans to build new headquarters for state police and the regional motor vehicle office nearby, and if the area is suitable for that, "why not put in a mall?"

However, Mrs. MacPhail said she hasn't yet decided how to vote, and wouldn't reveal her position even if she had decided. She is concerned that drainage runoff from the mall area might pollute the Ashuelot River, since 44 acres of land would be covered by buildings or parking lot.

Few councilors said mall proponents helped their case at the public hearing last Thursday.

Mycko, the real estate agent, "completely turned me off," Wilber said. "I have a lot of respect for the Barrett boys, but I think (Mycko) lied to us" by suggesting that stores like Filene's, Sears Roebuck and Jordan Marsh would consider locating in that mall.

Councilor Robert E. Williams said he also doubts that a high-quality department store will move into the mall; he thinks the highest-quality store in the development would be a J.C. Penney, a K-Mart, or an equivalent. Market studies show Keene isn't big enough to support better stores, he said.

McCollester pointed out that Mycko and Bradley said the council should consider only the rezoning issue, not the mall itself, but then promised the complex will produce more than $300,000 a year in property taxes.

"I was totally turned off by Mycko," McCollester said. "He summarizes all the fears we have about developers.

"A developer comes into town and says, 'Here, take this medicine, it's good for you.' You ask what's in it, and he says you're going to have to take it anyway, you're going to have a mall," McCollester said.

"I thought it was a shoddy presentation. I think the the most honest people I know are the Barrett boys, but for Mycko to stand there with his pompous little pretentious stance ... I mean, who needs him?" McCollester said.

Councilors Paul T. Cavanaugh said he is still undecided, but is "leaning against" rezoning. Councilors John W. O'Neil, Aaron A. Lipsky and L. Edward Reyor declined to reveal their feelings, saying they still want to hear objective comments from their constituents.

While Robertson said he opposes rezoning, he said he probably wouldn't vote on the issue because he might have a conflict of interest — since the council rejected a mall plan on land Robertson owns.

However, after City Attorney Charles H. Morang found that Robertson has no financial interest in the Barrett rezoning request, and thus no conflict, the council voted Wednesday night that Robertson should vote.

The Keene Planning Board voted 7-1 last month to recommend that the council reject the rezoning request, noting that Keene's community goals and land use plan call for housing on the Barrett property.

# City Committee Opposes Rezoning Land for Mall

**By GEORGE MANLOVE**
**Sentinel Staff Writer**

"I was in the right place, but it must've been the wrong time."

That rock 'n' roll song by Dr. John reflected the feelings of the Keene City Council Planning, Lands and Licenses Committee meeting Thursday night.

The committee voted 3-2 against rezoning a 68-acre cornfield in West Keene – the site proposed for a regional shopping mall. The land is owned by Ellis E. and Aubrey W. "Toby" Barrett of Keene.

The committee recommendation will be presented to the 15-member council before it votes on the rezoning issue next Thursday. If the council refuses to rezone the land from agricultural to commercial, it will also kill the mall plan.

The Barrett property is in West Keene, north of Route 9, west of Route 12 and south of West Street.

Committee Chairman L. Edward Reyor said Thursday he opposes the mall and rezoning because, while the site might be right for commercial development, it's the wrong time. Several other city councilors have said they'll oppose rezoning for the same reason.

"I think it's premature," Reyor said of the rezoning; at a later date, he said, he might support the rezoning request.

Councilors Terry A. Bishop and Michael E.J. Blastos voted in favor of rezoning Thursday, but were outweighed by Reyor, James A. Putnam and Lawrence G. Wilson, who voted no.

In a poll by The Sentinel this week, a majority of city councilors indicated they oppose the rezoning plan. So far, seven councilors have gone on record as opposed to rezoning, and two more are leaning against it.

Against the proposal are Councilors Gordon S. McCollester, Robert F. Wilber, Robert E. Williams, Timothy N. Robertson, Wilson, Putnam and Reyor. David R. Meader and Paul T. Cavanaugh are leaning against it.

Bishop and Blastos say they favor rezoning, and Councilor Ruth R. MacPhail spoke Thursday in favor of the mall plan.

Councilors John W. O'Neil and Aaron A. Lipsky are uncommitted, and Councilor Barbara B. Battenfeld was out of town this week and unable to be polled.

On Thursday night, Toby Barrett and his attorney, Homer S. Bradley of Keene, tried to convince the committee that rezoning is the right thing to do, even though it goes against the city land-use plan. The plan says the land should be developed eventually for housing, not business.

Bradley said the land-use plan is the only objection to the mall plan, and it should be ignored in this case because there's a shortage of good commercially zoned property in Keene.

The land-use plan is only a guideline; it's "not written in stone," Bradley said, and pointed out that city officials have veered from the plan on five recent occasions.

Bradley charged the plan has evolved into a city policy designed to protect downtown merchants. Opponents of the mall rezoning say a suburban mall will siphon business from the central business district.

Challenging arguments made at a public hearing last week, Bradley said downtown Manchester hasn't been hurt, "as far as I can see," by shopping malls on the edge of that city. Boarded-up storefronts in Manchester, which critics of the plan said resulted from business lost to the Mall of New Hampshire, may have been related to construction of a new bank, Bradley said.

He urged the committee to consider rezoning as a land-use issue, not on its economic merits.

But he said the mall proposed for West Keene won't hurt downtown business any more than new shops proposed on 6.5 acres now owned by the Boston & Maine Railroad on the east side of Main Street. The West Keene mall won't cost the city a dime, he said, but the B&M development requires construction of a $2 million street.

Putnam said if more commercial property is really needed, the Keene Planning Department and the council ought to study land uses throughout the city.

"I don't think the way to get that is to respond to a rezoning request for a specific piece of land," Putnam said.

Reyor said he opposes rezoning because he wants to block the mall proposed by the Barretts and Interstate Properties of Clifton, N.J., which would build the mall if the land were rezoned.

Reyor said he fears the mall would spawn too much growth too fast, growth the city is not ready for. He also doubts that the proposed mall would draw shoppers from a large area of New Hampshire, Massachusetts and Vermont, because gasoline is getting more expensive, and people aren't willing to drive very far to shop.

"I'm sure eventually we will have a mall," Reyor said, but now is not the time.

Other councilors say this may be the right time for a mall, but not the plan proposed by Portsmouth real estate broker Richard J. Mycko, who represents Interstate Properties.

*"I was in the right lane, but must've took a wrong turn."*
—Dr. John.

Many councilors are concerned about the quality of stores likely to move into the West Keene mall, but neither Blastos, Bishop nor Mrs. MacPhail saw that as an issue Thursday.

Blastos said the Barrett land should be rezoned because Keene needs more commercial land; free enterprise will determine which stores move in.

Bishop said he generally endorses the land use plan, but in this case doubts rezoning will hurt business downtown. Rather, Bishop said, the new stores will expand the city's tax base, helping weary property taxpayers.

Mrs. MacPhail urged the committee to "think of the taxes, think of the jobs" the new shops would create.

So far, a majority of the city council isn't buying those arguments.

# West Keene Mall Unlikely; Council Rejects Rezoning

**By GEORGE MANLOVE**
**Sentinel Staff Writer**

Plans for an enclosed regional shopping mall on 68 acres in West Keene were dashed Thursday night.

The Keene City Council voted 10-5 not to rezone from agricultural to commercial land north of Route 9, east of the Keene bypass, and south of West Street owned by Aubrey W. and Ellis E. Barrett.

The council also voted 8-7 not to reconsider its vote, a move which eliminates the possiblity that the council can take up the matter again. The action apparently kills mall plans proposed for the Barrett property by a New Jersey development company.

After weeks of controversy surrounding the mall issue, most councilors apparently already had their minds made up before the meeting. The debate was mild, and councilors simply explained which way they would vote, and why.

Councilors Robert E. Williams and Barbara B. Battenfeld both said they personally oppose mall plans, but a barrage of telephone calls and letters from constituents persuaded them to change their minds. Both voted for the rezoning.

Mrs. Battenfeld said that she would vote the opposite way of fellow Ward 2 Councilor L. Edward Reyor because, she said, since sentiment in Ward 2 is so evenly divided for and against the mall, two votes one way or the other would leave half of the people unrepresented. Reyor voted against rezoning.

Councilors voting in favor of rezoning included Battenfeld, Williams, Michael E.J. Blastos, Ruth R. MacPhail and Terry A. Bishop.

Opposing rezoning were Councilors Gordon S. McCollester, Paul T. Cavanaugh, Timothy N. Robertson, Reyor, John W. O'Neil, David R. Meader, Aaron A. Lipsky, James A. Putnam, Robert F. Wilber and

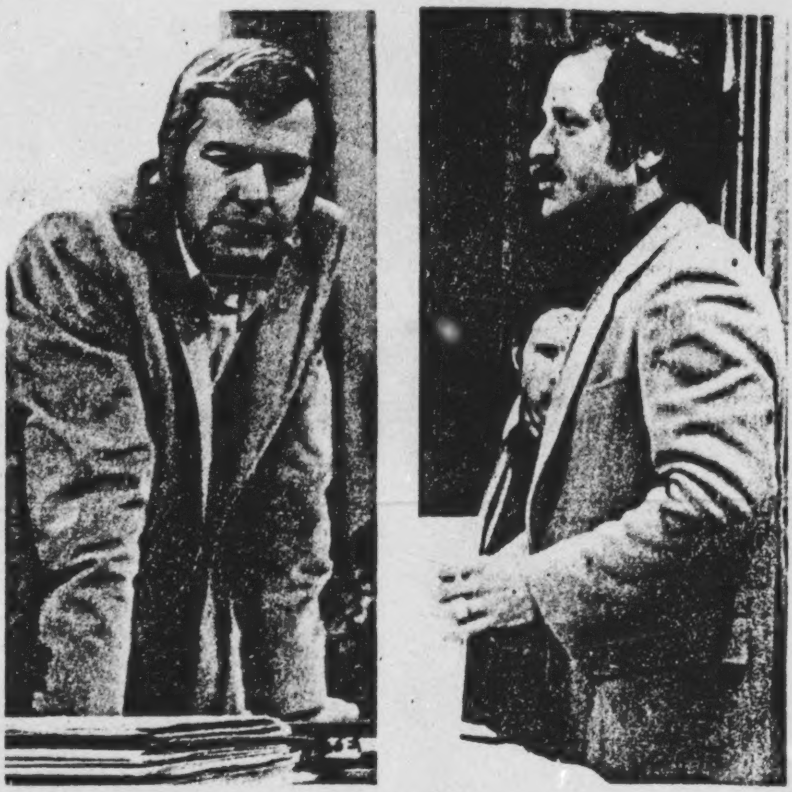
Blastos said he favored the mall plans because taxes from a mall would provide desperately needed property tax relief in Keene. If the land's use is changed from agricultural to commercial, he said, the property taxes on the land alone would provide as much as $100,000 a year. With a completely developed shopping mall, he said, the city could collect more than $300,000 in property taxes.

"We are being taxed out of our homes," Blastos said. "We need help desperately."

The city's land use plan calls for eventual residential use of the Barrett land, not businesses. Blastos argued that that plan should be abandoned in this case, because there is little or no good commercial property in the city for a major development.

But Councilor James A. Putnam and McCollester said they feel "12 years of community planning," as McCollester put it, shouldn't be thrown out with so little consideration.

(See PLANS — page 2)



*Pros and Cons*

City Councilor Robert E. Williams, left, argues in favor a shopping mall propo ed for land in West Keene, while Councilor Gordon S. McCollester argues

(Continued from Page One)

They said they would vote against rezoning, but would support taking another look at the land use plan, to see if more commercial land should be made available. Keene Mayor Richard P. Peloquin said such a study is already being done by the Keene Planning Board.

Mall plans unveiled by Portsmouth real estate agent Richard J. Mycko, who represents Interstate Properties of Clifton, N.J., the firm that would build the mall, call for a 300,000-square foot enclosed facility. The mall would contain three main department stores and 40-50 smaller shops.

Peloquin, too, spoke against the mall plans, saying that city officials and others at a public hearing on the issue March 20 were misled by Mycko. Peloquin said a telephone conversation with an official at Interstate Properties this week cleared up some misconceptions.

Arguments that the proposed mall would contain "high quality" stores, Peloquin said, applied only to the quality of construction.

Peloquin said he was told by a company official that the most likely tenants for the main stores in the mall would be K-Mart and Sage Allen, which owns J.C. Penney. He indicated that no high quality stores would move to Keene if the mall is built.

Furthermore, the construction cost would be closer to $6 million, not the $12 million to $15 million estimated by Mycko, Peloquin said, thus reducing the value of the mall and the estimated property taxes from $314,000 to $190,000.

Williams and Battenfeld said they feel that many people must leave Keene to shop and that means traveling long distances to reach other malls.

Mrs. Battenfeld said that a good many people will benefit by the proposed mall. Many can't afford the gasoline needed to drive to other malls, she said, and many Keene residents don't even own automobiles.

Aubrey Barrett said that the vote against rezoning was a mistake. The land will better serve the community if it becomes a future home for new business, he said

Asked whether he will appeal the council decision or what other plans he has for the land, Barrett shrugged and said he didn't know what he'll do.

# Guide Questions for Identifying Interest Groups from a Newspaper Report

## Introduction

Read the report from the Keene Sentinel (Feb. 12, 1980) of a planning board hearing on the subject of rezoning a piece of farm land in Keene, New Hampshire.

## Procedure

Answer these questions from information reported.

1. What is the central question to be decided by the planning board?

2. What arguments does Robert Broglia of Interstate Properties use for building a Mall?

3. What is the argument of the mayor? What is the argument of the member of the city administration (Merrifield)?

4. Does it appear that the planning board has prejudged the issue? Look carefully at the statements of Irwin and Rossiter.

5. Does the newspaper article or its headline show any bias in the issue?

6. "'You don't need to be a genius or an expert to tell if a town needs a shopping mall or not,' Broglia said." How does Broglia support his statement.

7. Comment on the department stores Broglia names. What impression do these store names make? What would be the effect of naming four other department stores?

8. How might downtown merchants react to Homer Bradley's statement that the mall might be helpful to them?

9. Why does the city's long-range plan provide for balance? What is the validity of this argument?

10. Make a table showing the breakdown of interest groups concerned with the Keene mall issue. Include the names of major spokespeople and the main points they made at the hearing.

# Summary of Two Positions on the Keene Mall Issue

The following remarks were made at various times by the REALTOR responsible for arranging the sale of the Barrett land to a mall developer.

The proposal to rezone the Barrett land from agricultural to commercial is good because -

1. The land, unoccupied, is privately owned. At the present time it is used for corn production, but its heavy soil is poor for this or other crops.

2. The increased traffic should be around the mall and would relieve congestion in the downtown area.

3. The mall would give employment to 800-1000 persons, many of whom would be young people and unskilled persons. These two groups are the only two underemployed groups in the area.

4. The topography of the area is ideal for commercial development. There are no other such suitable areas in Keene.

5. The water table is too high for residential use.

6. On an adjacent piece of land, owned by the State of New Hampshire, a state police motor vehicle safety office is being planned. Access to this state facility does not conform to highway safety standards. The mall

The following remarks were made by the CITY PLANNER during an interview.

Although the City Planner expressed no opinion directly on the issue of rezoning the Barrett land to allow for its use as a mall site, he made the following points:

1. Keene, New Hampshire, has a master plan developed over years of study (1967-1975) with input from all sectors of the community. It is designed for the total good of the community. Such a plan should guide land use decisions. Zoning is one means of planning.

2. The land proposed for the mall site is in the area of the hundred year flood plain. The danger of the repetition of serious floods such as occurred in 1936 and 1938, has diminished since flood control dams have been built by the Army Corps of Engineers. However, any blockage in the spring water flow could still cause great trouble. Underground water must go somewhere. Two shopping plazas across the highway from the proposed mall have already violated flood plain recommendations.

3. A city must maintain its capital investment in roads, curbs, buildings (public and privately owned) footings, drainage systems, water and gas lines and manholes. Allowing these facilities to

developers would build an interchange that could give proper access at no cost to the state taxpayers at the same time that they build the entrance to the mall. The new road would also include a proper interchange for the industrial area south of the mall.

7. The mall would increase the tax base of the City of Keene. (An immediate increase of $6-$8 million in the tax base.) This increase in taxes is essential to the city because the cost of schools and services rise rapidly.

8. The mall would be isolated from most residential areas. There is a brook and swamp on the west, a railroad on the north, and highways on the east and south.

9. The 'middle quality' stores of the mall would complement the 'high quality' stores of the downtown area.

10. The proposed mall will be small as malls go (300,000 square feet) and will cost between six and eight million dollars to build. It will contain perhaps three large department stores (Filene's, Jordan Marsh, Sears, and J. C. Penney have been mentioned) and 30-40 other stores and specialty shops.

11. A good highway system and no state taxes would attract Vermont and Massachusetts shoppers not only to make purchases at the mall but also to purchase

deteriorate by lack of maintenance erodes the tax base. The city's investment is in the downtown area.

4. The traffic pattern for Keene as seen in the master plan is designed to direct the shopping traffic to the downtown area.

5. The master plan is designed to maintain a careful balance between land used for manufacturing, commercial and public use, and housing. A sound economic base for an independent community should have one acre of manufacturing, to every two acres of commercial and public use, to every four acres of housing. If this proportion is changed from that described in the master plan by rezoning an area designated for residential to an area for commercial (the mall), then, the whole city plan is out of balance.

6. Malls do not save energy. Service people would have to travel from a wide area because Keene could not supply the necessary labor force. People would come from a wide area so long as the mall is a new one. Over a long period what attracts people is uniqueness - a quality not found in malls.

7. A mall would not be good for Keene as a whole. A mall is designed to benefit mall owners and renters and is not concerned with what is best for Keene.

8. Keene is a microcosm of the United States, however, the average income is below the national average. Department

at non-mall establishments such items as liquor and tobacco which generate state revenues.

12. Other non-mall enterprises would benefit, such as food stores, gas stations, restaurants and motels.

13. Time, money and gas would be saved by local residents who now travel to other malls to do their shopping.

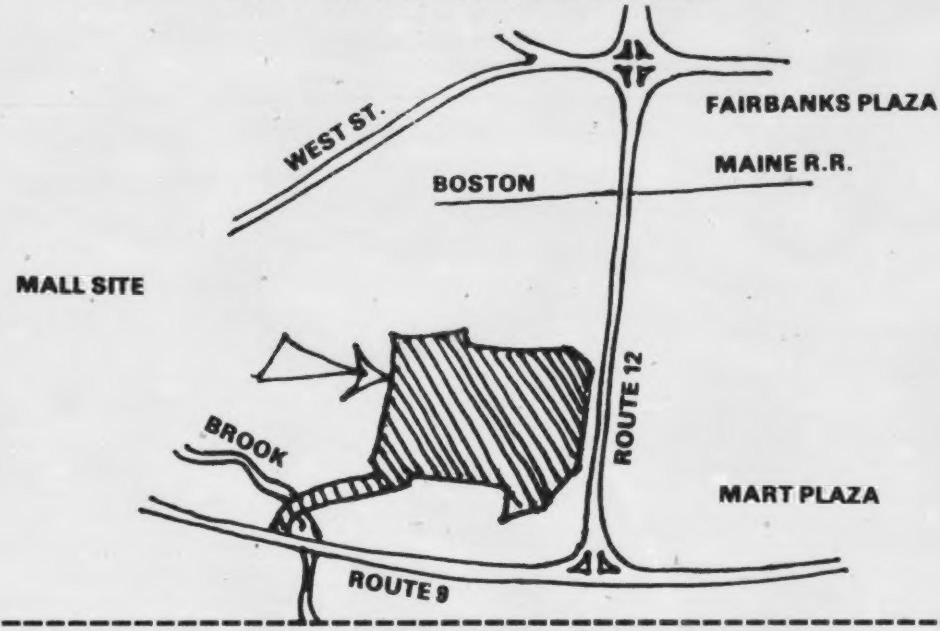
14. Such facilities as sewer, water and railroad lines are already in place.

15. Finally the proximity of the State Police headquarters would deter vandalism.

stores, such as Filene's or Jordan Marsh, have looked at the Keene market before and are not interested. The big chains, such as K Mart, Bradlee's or J. C. Penney, might be interested. Sears is a possibility. Most of these stores are available to the Keene shopper now.

9. A community needs to have a healthy self-image. The uniqueness that attracts out of towners to an area also helps residents identify themselves. Revitalization of the downtown area has proved to increase a positive community self image.

## MALL POLL
## ONLY THOSE OVER 18 PLEASE


WEST ST.
FAIRBANKS PLAZA
BOSTON
MAINE R.R.
MALL SITE
ROUTE 12
BROOK
MART PLAZA
ROUTE 9

## MAKE YOUR VOICE HEARD
## PLEASE COMPLETE AND RETURN

I WOULD WELCOME AND SUPPORT THE ADDITION OF A QUALITY SUBURBAN SHOPPING MALL FOR KEENE.

YES NO

TYPES OF STORES I WOULD LIKE TO SEE IN THE MALL

______________________________

______________________________

______________________________

COMMENTS: ______________________________

______________________________

Signature______________________ Address______________________

Please give your phone number if you are willing to attend a public hearing.

Phone______________________

Please Return this by mail to the Keene Sentinel Box 33, or if you prefer you may drop it off in person at the Mall Headquarters Office in the Fairbanks Plaza on West Street From March 1-15, 1980.

## Summary of Mall Poll Results

Total number returning this Mall Poll - 950

"I would welcome and support the addition of a quality suburban shopping mall for Keene."

| | Yes | No | Percent |
|---|---|---|---|
| Keene | 479 | 147 | 77 |
| Out of Town | 247 | 79 | 76 |
| Total | 724 | 226 | |

"Types of stores I would like to see in the mall." Top 10 mentioned.

| | | | |
|---|---|---|---|
| Jordan Marsh | - 265 | Marshalls | 77 |
| Sears | - 246 | Montgomery Ward | 57 |
| J. C. Penney | - 182 | Lechmere | 57 |
| Filene's | - 152 | G. Fox | 37 |
| K Mart | - 77 | Anderson-Little | 33 |

(figures supplied by Toby Barrett)

# Guide Questions to the Study of an Opinion Survey

## Introduction

This advertisement appeared in the Keene Shopper News and the Keene Sentinel.

Based on your impressions of the format and wording, answer these questions.

1. Was this questionnaire placed in the newspaper by a group favoring the plan to construct the mall or by a group opposing the plan?

2. List your reasons for your judgment.

3. Is the mall site exaggerated or diminished in size compared to the width of major highways (routes 9 and 12)? Does the size comparison influence you one way or another?

4. Does the hand drawn appearance of the map suggest whether a private group or a government agency prepared the advertisement? If the map had been drawn by an architect or professional draftsman would the appearance influence you?

5. Comment on the use of "welcome" and "support" in the wording of the question.

6. Does the request to name stores make any assumptions about how reader's opinion has been expressed?

7. What is the reason for requesting signatures, addresses and phone numbers? Will this request influence the outcome of the opinion survey?

8. What is the effect of inviting respondents to return the opinion form in person to mall headquarters?

9. Why is the opinion survey limited to persons 18 years or older in age?

10. Redesign the opinion survey as you believe it would appear had someone on the opposing side designed it.

# Activity: Putting it All Together

## Introduction

Once facts have been gathered, opinions surveyed, and the issue clarified, students should decide where they stand on the issue. Ideally, students should make their decision about the best way to use the land in question prior to the time when the official decision is reached. For one thing, this will heighten student interest in the decision-making process.

Some ways to conclude the study of a local land use issue are suggested below. The first set of activities leads to a summary of facts and opinions. The other set describes ways in which personal expressions of opinion can be effectively organized and presented.

## Some Ways to Summarize The Issue

1. Conducting a simulated public hearing will develop both speaking and listening skills. Role playing is an effective way to bring all sides of an issue into discussion. Roles are assigned so that the opinions and facts gathered and studied are included. The class conducts a mock public hearing before the city council. After hearing arguments, the mock city council makes its decision public. (If arrangements can be made to have another class not involved in the study participate, their responses may be a fair index of the effectiveness of the arguments presented.

2. In those schools where TV equipment is available, the production of a documentary might be considered. Interviews with the principals involved, shots of the land in question and its surrounding area, pictures of proposed projects (other malls, interstate interchanges, industrial parks, or whatever), and action shots of people and machines can be presented especially well through this medium.

3. A simple method for making a slide/tape program is described in the unit, Using the Winter Wilderness (p259). Many of the best features of a documentary film can be approximated in a slide/tape program at low cost.

4. Using the school's radio broadcast facilities (or simulating a radio talk show) should not be overlooked as a relatively direct way of learning how to prepare statements and organize them effectively. Without pictures or action, the presentation of information becomes a challenge worthy of consideration.

## Some Ways to Present Opinions

1. On the board, list all the distinct opinions on the issue that have been gathered by the class or can be generated in class. Ask the students to rank the opinions from most to least according to their validity as arguments, regard-

less of the side of the issue they espouse. This becomes not only an exercise in practicing logic, but a stimulus to reexamining personal opinion.

In the case of the Keene Mall, a class might consider these two arguments to rezone the site for commercial development: (a) The mall would be an economic boon to the community because it would generate tax revenues and because consumer dollars would stay within the area. (b) The present agricultural zoning is unrealistic and even the Keene Master Plan advocates changing it (to medium density residential), therefore, it seems reasonable to consider rezoning land for commercial uses.

Which of these is the better reason for voting for rezoning the agricultural land to allow commercial use? Do the same for arguments against the rezoning. Assessing the validity of the arguments will generate discussion and provide for valuing opinions and feelings.

2. Students write letters to the editor of the local newspaper. The class then hears the letters, discusses them and selects the best two or three to submit to the editor. Or, students can submit their letters individually.

3. Students write a definitive essay or position paper in which they are asked to state an opinion and defend it carefully. To avoid the temptation to espouse the "right" position or to come to the aid of the "losers," opinion papers should be assigned prior to the official decision and kept secret until that time.

4. Every effort should be made to have some students attend hearings and decision-making meetings and report to the class. Students whose own opinions are well-formulated and known to the class may present different views of what transpires at a meeting or hearing. Assessing the reports will be a valuing exercise for the class.

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